



FRIDAY, FEB. 14.

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Contributions.

Worsdell, von Borries & Lapage's System of Compound Engines.

LONDON, Jan. 27, 1890.

TO THE EDITOR OF THE RAILROAD GAZETTE:

As the representatives of the Worsdell, von Borries & Lapage system, we send you a short account of starting valves, which we think will be of interest to you.

We should also like to correct a statement made at the Western Railway Club on Oct. 15 last to the effect that "Messrs. Beyer, Peacock & Co. have a compound, a design of their own, which they are recommending for all purposes." The compound engines Messrs. Beyer, Peacock & Co. are building are on the Worsdell, von Borries & Lapage system, and they have sent us returns during the year 1889 of 60 engines, on which they have paid royalty, and they are now building large numbers.

TAITE & CARLTON.

Locomotives for Suburban Traffic.

TO THE EDITOR OF THE RAILROAD GAZETTE:

As the subject of locomotives for suburban trains seems to be interesting to the readers of your paper, I wish to indorse the views of your correspondent, G. B. I have had a great deal of experience with the type of engine your correspondent speaks of. There is another advantage in this type, that they are made to run either way, and therefore they have not to be turned around. The tanks extend from the cab to the smoke arch; thus the whole weight is on the drivers, and, having a quick valve motion, they start a train readily, and, being equipped with air or steam brakes, they can be stopped in the shortest possible time in an emergency. When I was on the London, Brighton & South Coast Railway 25 years since, engines were in use having six wheels, coupled, with leading and trailing wheel, fitted with a radial axle and boxes. They weighed between 35 and 40 tons, and were considered most economical machines, both with regard to fuel and repairs. Engines of this type are used by nearly all roads in and around London at the present time. This was my observation when I was in London a few years since, and no trouble was found in curving. I have a general plan and details of this type of locomotive which I shall be pleased to let any master mechanic have who is interested in suburban train service.

S. D.

S. D.

Slip of Drivers at Speed.

TO THE EDITOR OF THE RAILROAD GAZETTE.

In an editorial in your paper of Jan. 24 you refer to the alleged tendency of locomotives to slip their driving wheels when running at high speed. There seems to be no doubt from the evidence of some observers that under certain conditions this actually occurs. May it not be attributed to the action of the counterweights placed in the driving wheels to balance the reciprocating parts of the machinery, and is it not most likely to occur when this counterbalancing is so complete as to neutralize entirely the fore and aft and sinuous disturbances of the machine due to the horizontal movements of the pistons and appendages.

If my calculations are correct the counterweight required in each wheel of an ordinary eight-wheel engine with cylinders 17×24 in. and 62 in. driving wheels to balance the pistons and appendages amounts to about 270 lbs. at the radius of the crankpin, or 135 lbs. at a radial distance of 24 in.

At a speed of 45 miles per hour a 62 in. wheel makes over four revolutions per second, and the counterbalance had a velocity of 66 ft. per second. The impact due to

the centrifugal force of a weight of 135 pounds at the foregoing velocity is 5,500 lbs. In the downward path of the counterweight this blow is received and absorbed by the rails and substructures, but in its ascending path it is spent on the wheel and appendages, tending to lift it from the track and reduce the adhesive weight of the engine to that extent.

In the case of the New Haven engine cited by you, the weight on the drivers on one side of the machine is $\frac{54,000}{2} = 27,000$ lbs. This weight would be reduced to $27,000 - (2 \times 5,500) = 16,000$ lbs, at the moment that the piston on that side is at rest preparatory to commencing the back stroke, and there is nothing to impede the momentum of the balance weights of the two wheels. It seems to me if the steam power of the cylinders is nicely adjusted to the adhesive weight, that the factor I have suggested will undoubtedly manifest itself by causing the engine to slip when running at high speed.

[So far there is no proof that locomotives do slip their drivers at high speed, but the action which is here suggested is one which would increase a tendency to slip and might in some light engines with heavy reciprocating parts result in considerable slip. What is needed now is a series of accurate observations with the lightest class of engines. Careful experiments with heavy engines show no slip to exist.—EDITOR RAILROAD GAZETTE.]

Standard Rail Sections.

NEW YORK, FEB. 7, 1890.

TO THE EDITOR OF THE RAILROAD GAZETTE:

At the late annual meeting of the American Society of Civil Engineers a motion was made to discharge the Committee on Standard Rail Sections. While the argument that it is without the province of the Society to adopt as a standard any particular section is undoubtedly of weight, nevertheless that is not a reason why the committee should be discharged. There is much work that such a committee could most profitably do, and work that is unquestionably within the province of the Society.

At the present time we are tentatively seeking to find the best section; or series of sections, for it does not follow that the same lines will give equal satisfaction in 90-lb. and in 45-lb. rails. The decided failure of some of the recent heavy rails shows conclusively that something is wrong, and probably the trouble lies in the section, and the result is that the last designs are tending to thinner and flatter heads.

Both manufacturers and purchasers are equally interested, and anxious to arrive at the truth, the purchasers especially to arrive there quickly. By the necessities of the case the experience of any one man is limited, and in order to know what others are doing, and with what results, there must be some medium of comparing results. Such a work can most readily be done by a committee of the Society.

Therefore, the committee should be allowed to proceed, and composed as it is it will at once command confidence. Let it collect all evidence as to wear and failure of various sections, and show what work is being done. Even let it recommend a section or series of sections, which seems by the light of to-day's experience to be most fitted to give best results.

The report need not be adopted, nor need the Society officially become responsible for it. But the committee will, by having for the first time brought under one cover all the facts relating to this subject, have accomplished a most valuable purpose, and will have conferred a great benefit on all those interested in this question.

For one, I hope, therefore, that this motion will not prevail, and that the *Railroad Gazette* will use its influence to have the committee continued and its valuable purpose fulfilled.

WM. BARCLAY PARSONS,

[By all means let the committee go on and collect and make public the information and opinions which its investigations are certain to bring out. The question of the adoption by the Society of standards can be fought out when the report comes in.—EDITOR RAILROAD GAZETTE.]

Concerning Eyebars.

TO THE EDITOR OF THE RAILROAD GAZETTE:

The writer does not intend discussing here the form of eye, best relative thickness or size of pin, or other similar feature of the eyebar, because those subjects have been fully discussed by others in their proper connection. But he wishes to call the attention of engineers, and railroad engineers in particular, to one point in the use of eyebars that he believes has been entirely overlooked.

As the science of bridge designing has grown new points of distribution of strain have been developed, new economies of design have been secured, and specifications have been drawn to cover all points possible, and secure, as far as may be, the best bridges for the uses. The buyer of a bridge makes his specifications so he may be sure of getting the best workmanship, the best quality of material and full sections to resist the strains put on the various parts. He leaves, usually, to the contracting bridge builders the design of the structure, so

far as the disposition of the material is concerned, and hopes in that way to secure the greatest economy without loss of strength.

In this search for economy probably the greatest change made has been in the length of panels. The "old Howe truss," which we may almost call the father of truss bridges, had short panels, 11 or 12 ft. long, and probably necessarily so. Iron single system bridges were then made with panels little longer; following these the double system was introduced with little or no change in the length of panel, when it was found that economy of design was greatly enhanced by increasing the length of panels. This, by reducing the number of parts and increasing their size, secured at the same time increased economy in shop work.

But with all these changes, the only modification, in the deduction of the size of parts from the strain applied, has been in using a greater unit strain for dead than for live load. An engineer in designing a deck bridge in which the cross ties rest on the top chord will after determining his general strain sheet, calculate the effect of the load in each panel as it acts on the top chord which serves at the time as a stringer. From this he will increase the top flange and decrease the bottom in accordance with the amount of plus or minus strain they may be subject to in acting as stringer flanges. I have never heard of the weight of the chord itself being taken into consideration; why not? It is small, to be sure, in comparison to the other loads, but does any engineer ever omit the weight of his stringer in determining its flanges. A load applied to any girder must produce either a direct strain or some modification of the strains already existing. Suppose a beam supported at both ends is loaded, or with its own weight as a load, we have a compression in the top flange and a tension in the bottom. Suppose, then, we apply at the ends of the girder forces that would produce in the girder a uniform tensional strain throughout its section, could such forces in any way modify the tendency of the transverse load?

Or to go back to eyebars; while the bridge is on the false work and before it is swung, the bottom chord bars are beams supported at both ends and loaded by their own weight. Can the swinging of the bridge, which brings a tensional strain on the bottom chords, change in any way the transverse tendency of the weight of the bar? Let us take an example: Assume a 6×1 bar in a 30-ft. panel, and we will find a strain in the extreme fibres of 4,500 lbs. per square inch, the bar weighing 20 lbs. per foot and its moment of inertia being 18. Now if the bar has a transverse strain of the above amount, the application of a longitudinal pull cannot remove the weight of the bar and cannot change the effect of that weight on the bar, except to counteract the opposite forces, decreasing the compression in the top fibres, but, of course, increasing by the same amount the tension in the bottom fibres. Hence, a 6×1 bar in a 30-ft. panel, if strained by dead and live load to 10,000 lbs. per square inch, must really have only 5,500 lbs. on the top, but have 14,500 lbs. on the bottom fibres. It would seem that there could be no doubt that if the weight of the bar were increased, the bar would eventually begin to tear on the lower edge. Or, what is the same thing, if the longitudinal force be increased until the strain produced, plus the fibre strain due to transverse effect of weight of bar, be greater than the breaking strength of the bar, the same effect would be produced. This could be proved by placing in a testing machine a bar, without any supports between the ends, and straining it to such a point that the strain applied, plus the transverse fibre strain, would exceed the elastic limit. When taken from the machine the bar should be found to be bent, the lower edge being stretched, the top edge not having been strained to the elastic limit.

CHAS. J. BATES.

CHAS. J. BATES.

English Car Journal Lubricants and Methods of Testing.

CONTRIBUTED BY AN ENGINEER OF TESTS OF AN ENGLISH RAILROAD.

The usual method of an oil merchant in opening business with an English railway company is to send sample supplies, and then, after a thorough practical trial, orders follow on, and each company adopts its own tests just according to chemical or mechanical test accommodation. Every railway company specifies the specific gravity to be from 920 to 921 at 60 degrees Fahrenheit; the viscosity to be about 320 at 80 degrees Fahrenheit, 300 being the minimum and 350 the maximum (viscosity equals seconds' flow of 50 c. c. at the given temperature); the oil shall not have any tendency to gum after being exposed at 212 degrees Fahrenheit for 48 hours; it shall neither be alkaline nor acid, and perfectly free from all dirt and foreign matter, and the flash point shall be as high as possible, certainly not below 350 degrees Fahrenheit. In fact, every carriage and wagon superintendent will expect the greatest amount of body consistent with fluidity, with a reduction of friction to a minimum; also greatest capacity for receiving and distributing heat, and with oxidizing qualities low, a high evaporation, low solidification and a neutrality with respect to alkalies and acids. If he gets all these conditions fulfilled he would get almost a perfect lubricant, one which has the greatest adhesion to metallic surfaces, and the least cohesion in its own particles. Although, on the whole, testing may be a very

it was considered the best economy to make the bridge fit them as they stood. The depth from grade to the step on which the span was carried was not sufficient for a first-class deck bridge, and the upper part of the abutments were not considered good enough to carry a through bridge; hence the arrangement shown.

The span is 150 ft., divided into eight panels. The depth of the truss is 24 ft., and the bridge is pin connected throughout. The grade line is 18 ft. above the lower cord pins. The floor line cord below the floor beams takes the wind strain and the lateral strains of service.

The bridge is single track and calculated to carry safely the heaviest locomotive used by the New York, New Haven & Hartford Railroad, the weight of which with tender is 192,466 lbs.

The Purchasing and Care of Supplies.

I.

The cost of materials of various kinds constitutes a large portion of the expense of constructing and operating a railroad, this element in operation alone being nearly equal to half the yearly expenditures. Upon a line where the total operating expenses reach into millions it can be readily seen how large are the sums involved in the supplies passing through the purchasing and store departments, and how great is the economy that may be made in saving, even a comparatively small percentage of the total amount. It is necessary, therefore, that everything connected with the hand-

made with those whose duty it is to carry the stock, to make early or extra requisitions.

After the supplies have been contracted for and delivered, there are many matters to be taken into consideration before they are finally used. They must be examined to see that the quantity and quality are as ordered, so that the invoices or bills can be approved for payment. They must be cared for until actually needed for the desired purpose, and finally they must be watched to see that they are not issued improperly or diverted from their legitimate use.

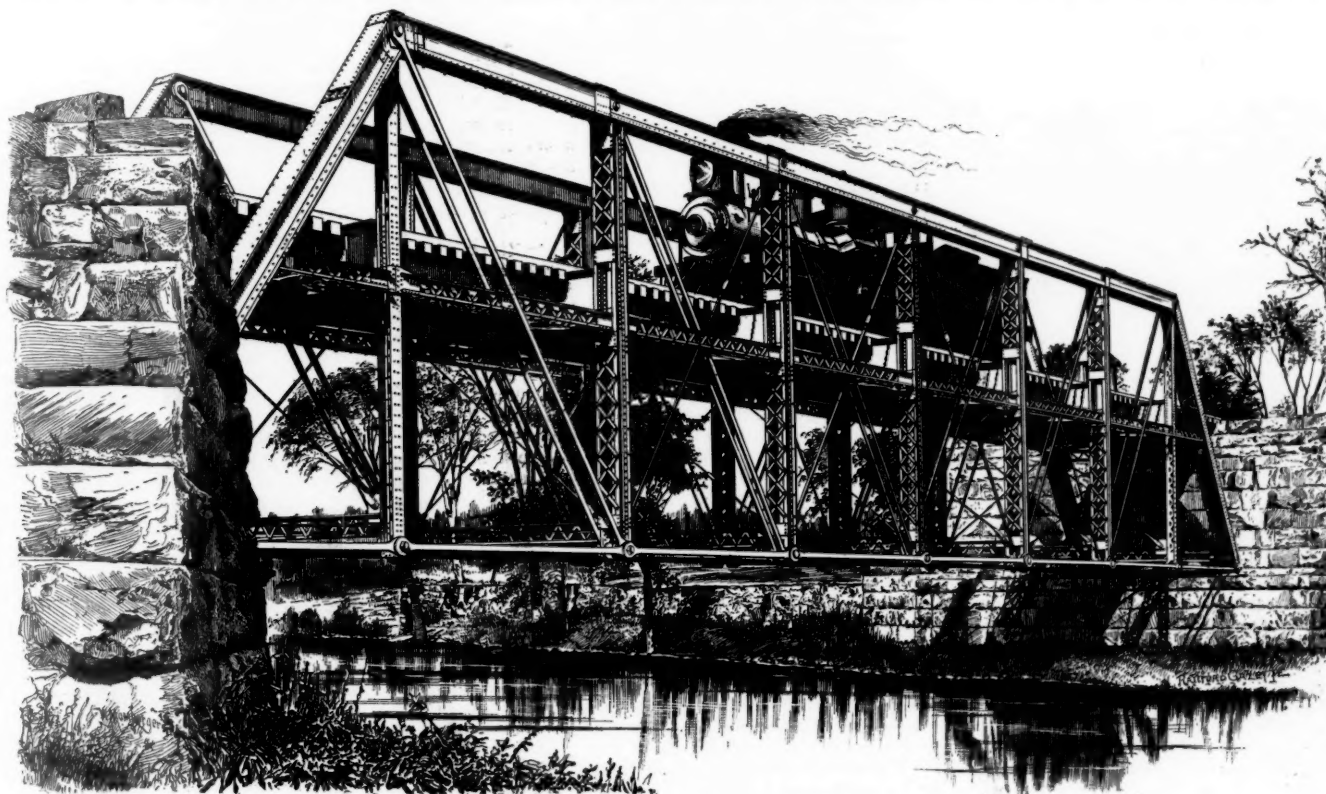
The duty of receiving the material devolves usually upon an officer variously known as the supply agent, storekeeper or shops clerk, according to the usage upon the particular road concerned. Sometimes this officer belongs directly to the purchasing department; sometimes he reports to the superintendent of machinery. He may be an appointee of the treasury department, or he may have, to a certain extent, a separate department, and report to the general superintendent or manager.

It is better, as far as our experience has indicated, that the storekeeper or supply agent should not belong to the purchasing department, as it is always safer and better that another officer than the one purchasing supplies should receive and care for the goods. In this way each forms a more efficient check upon the actions of the other. There are disadvantages also in having such an officer under the control of the mechanical department, as it is inexpedient that the officer who uses the goods shall have the care of them as well, and thus issue to

plan will lead to the most intelligent carrying of stock by supplying the needs of the road with the least locking up of money in surplus material.

No matter what may be the location of the storekeeper as regards his superior officers, his duties do not materially vary upon different roads. It is his business to see that the goods received are as ordered, and to check and approve bills for such goods as are sent by the dealers through the purchasing agent's office, where the prices are examined. After the receipt of the various articles of supplies and their charge upon his accounts, the storekeeper has to see that materials are cared for until issued upon a properly approved requisition, and such requisitions form his vouchers or authority for these issues in case his accounts are checked up. Finally, he has to order from the purchasing agent such articles as are necessary to replenish his stock, and he reports to the auditor the value of materials on hand monthly, as also the amounts charged out to the various operating or construction accounts.

After material of any description has passed the necessary inspection and tests which show it fully up to the specifications furnished, and the quantities and grades agree with those mentioned upon the bills sent by the purchasing agent, there are still many interesting questions involved in its proper care and use. Materials may be carefully and cheaply purchased and fully up to the desired standard, but may yet be a cause of loss to the road owning them. If supplies are not properly cared for, they may deteriorate in various ways; if they are



TORRINGTON BRIDGE.—NAUGATUCK DIVISION, NEW YORK, NEW HAVEN & HARTFORD R. R.

Built by the BERLIN BRIDGE CO., East Berlin, Conn.

ling, caring for, and using of supplies should be attended with the utmost system and care to insure the best result in economical operation, upon which, as well as upon the gross amount of revenue collected, depends the income of the stockholders.

As a general rule we may assume that the purchasing agent is the officer through whose hands come the orders and contracts for furnishing all supplies needed for railroad purposes. It is not necessary to dwell at length upon the characteristics of the person best fitted for a successful purchasing agent. It is safe to say in general terms that the qualities necessary to make a successful merchant apply largely to the efficient purchaser. Absolute honesty and an eye watchful at every point for the advancement of the company's interests rather than his own are two imperative requisites. It is fair, we think, to say that as a rule, with the average purchasing agent, his honesty of purpose and devotion to the interests of his company are fully equal to those of the officers in charge of any other departments of the railroad service.

Not only is there a difference upon various roads as to the scope of the purchasing agent in the classes of goods which are under his control, but we find a variation in the method by which such supplies are ordered. The general practice seems to be, that while the purchaser only buys as requisitions are made upon him, he is allowed a certain amount of leeway to take advantage of fluctuations of the market by laying in supplies for the future, when there seems a chance of saving money in purchase price or a likelihood of delay in having the required articles promptly furnished if orders are not placed in time. In such cases arrangements can be

himself. When the master mechanic controls the supplies, there is apt to be a tendency towards too great accumulation of material, thus locking up capital. This is owing to the natural fear of not having enough material for the company's needs; and having the ordering in his own hands, the temptation is great to keep all stocks up to the highest point. It is claimed by some railroad men that the storekeeper should be an agent of the treasury or accounting department in view of keeping a closer check upon the records. It hardly seems to be necessary that this method should be followed, for, as far as accounts are concerned, the necessary records and accounts can be kept to the satisfaction of the auditor, no matter in what department the stores are placed, and any rules made by either the auditor or treasurer can be fully carried out.

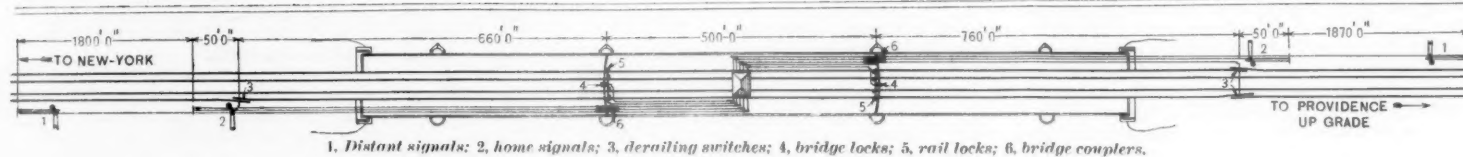
From our experience the needs of the service demand that the storekeeper, who deals more directly with the operating departments than the purchasing agent does, should report to the general superintendent. In this way he remains in the general operating staff, but is not under the head of any one particular department, and can serve to some extent as a check upon the actions of all. At the same time, being under the general superintendent, his actions can be regulated promptly, if not in harmony with the needs of the service. If, on one hand, the storekeeper endeavors to run his stock at such a low ebb that there seems danger of the business of the company suffering, the various departments have the right to call on the general superintendent to interfere in case their requisitions are not promptly honored; while, on the other hand, if too much stock is carried, the general superintendent can see that a reduction is made. This

not watched in their issue they may be wasted or not used to the best advantage, and if too much stock is carried either from a surplus of available goods or an accumulation of unstandard material, there is a locking up of the capital of the company, which is to a certain extent a crippling of its financial powers.

The supply agent, as a rule, should be expected to carry only such kinds and quantities of material as are needed for the ordinary uses of railroad operation. Supplies for large undertakings should only be purchased when proper notice has been given that such work is to be undertaken and the notice of the same should be given in time to buy the needed supplies to the best advantage and have them on hand early enough for the purposes desired.

Neither should the supply agent carry such odd articles as may only be needed once or twice a year, as there is danger of thus building up an accumulation of goods which have become out of date and unstandard. On the other hand, the storekeeper has to be careful, as we have already stated, to avoid delaying work of any kind on account of insufficient supply of materials. In order to strike the happy mean of the lowest amount which can be carried in stock and yet fill all the needs of the road, we must consider the various classes of material somewhat in detail, and study the relation of each class to its particular supply and demand. The complication of the class, whether consisting of few or many articles, the rate at which they are used, and the time necessary to obtain new supplies to replenish that particular stock must all be considered.

In watching material in detail the set of records called on some roads a stock report forms a valuable aid. This



General Plan.

consists of a memorandum account kept with each one of a large number of the leading items of supply, showing the value on hand the first of any month, the amount received, amount issued and balance remaining at the end of the month. By examining this report a few months it will show the relations that should exist between the stock held and the amount issued.

It is claimed sometimes that because these stock reports do not show the quantities rather than amounts they are of but little practical value. A very short examination, however, of their working will show that the various items serve as an index to point where any irregularities may exist, and after the items or classes of material have been located, it is an easy matter to go to the material itself and by examination find whether there is anything that is slow or unstandard, and a special inventory of that class can be taken if necessary. In a future article we shall try to elaborate somewhat in detail some matters affecting the handling of a railroad supply stock efficiently and economically.

[TO BE CONTINUED.]

Protection of the Thames River Drawbridge.

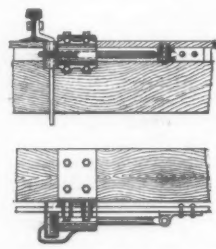
We illustrate in this issue the arrangement of signals by which the Union Switch & Signal Company has protected the traffic across the new Thames River drawbridge at New London, Conn., on the line of the New York, Providence & Boston.

There are but four signals—home and distant for east and west-bound movements respectively. There are three derailing switches—one near the east-bound home signal, 660 ft. from the draw; one near the west-bound home signal, 760 ft. from the draw; and one in the east-bound track, 760 ft. east of the draw, so arranged as to derail cars moving west on that track. There is a heavy up-grade from the bridge eastward, and it was deemed prudent to make provision by which runaway cars or detached portions of trains coming down the grade should be derailed before reaching the bridge.

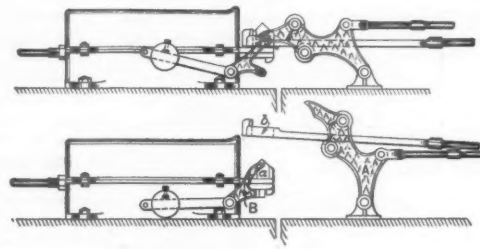
In addition to the four levers for the four signals, there are two levers for the three derails, one lever for uncoupling the pipe connections at each draw pier preparatory to opening the draw, one lever for unlocking the bridge itself preparatory to opening the draw, and one lever to operate the bridge light which indicates to navigators whether the draw is opened or closed. This makes nine working levers, but a twelve-lever frame was used, giving three spare spaces.

The interlocking is such that before the operator can release the draw (which is swung by steam power from the engine room below), he must first set all signals to danger, open all derails, uncouple all pipe connections at the ends of the draw and unlock the draw itself, with its rail connections. While the draw is open all signals remain automatically locked at danger and all derails locked open. After the draw is again swung to line, the draw and rails must first be locked, then the pipe connections at the draw piers made complete, and then the derails must be set closed and locked, before clear signals can be given.

The above operations are all accomplished by mechanical means, but electrical circuits are cleverly utilized to accomplish certain other desirable results. An annunciator notifies the operator of the approach of trains from either direction. The insulated section of track which operates the east-bound annunciator is 4,500 ft. west of the cabin; that for the west-bound is one mile east of the cabin. As neither of the distant signals, either east or west, is within sight of the cabin, they are electrically connected to miniature repeaters, located in the cabin, the arms of which respond to the actual movements of the semaphore blades of the distant signal themselves. In the case of a drawbridge, it is of the utmost importance that a train proceeding under a clear signal shall be insured a complete and continuous track until the most remote danger point has been passed. In the Thames River apparatus this is accomplished by electrical circuits, which come into action when a train reaches a point 100 ft. from its distant signal. The ac-



Detail of Rail Lock.

Fixed Span. Draw Span.
Detail of Bridge Coupler.

SIGNALING AND INTERLOCKING OF THE THAMES RIVER DRAWBRIDGE.

tion of these electric circuits is such that when thrown into play by the passage of a train past a distant signal, electric locks are applied to levers four and eight (which operate the derails), making it impossible to move these levers or open the derails until the train has passed the releasing point, which in the case of east-bound traffic is about 800 ft. east of the draw and 40 ft. beyond the last derail; the releasing point for west-bound trains is just west of the draw. The electric circuits required in this connection involve track relays, interlocking relays, local batteries, main batteries, circuit breakers and electric locks, so disposed that the effect shall be continuous during the transit of a train from starting point to releasing point, including three separate sections of track in each case.

When the operator in the cabin is ready to have the draw opened, he notifies the engineer below by electric bell-taps, but as an additional safeguard, a circuit breaker is introduced in the bell circuit, so that the circuit is not complete, and no signal can be given until all required preliminaries have been gone through with. The bell circuit is finally automatically completed at the circuit breaker, by the motion of lever No. 7, which unlocks the draw and the connecting rails. The various circuits from the cabin on the draw to the shore spans of the bridge are run through a six-conductor cable, which is carried down from the cabin in the vertical axis of motion of the bridge. This cable is of course subjected to a slight torsion, which is however, quite within any limit of danger.

The rail lock is simple and positive. It is shown in plan and elevation in the cuts. To each of the four rails is bolted a piece of flat iron, which is pierced for a plunger. When this plunger is home the rail cannot be raised. But when the rail lock lever is reversed and the rails unlocked, the derail levers are locked in the position in which the derails are open, and the signals, of course, locked to danger. So long as the rails are up the plungers will not enter the holes, and consequently the rail lock levers cannot be thrown, and the derail and signal levers must remain locked. In other words, the rails must be in place and locked before a train can possibly be admitted to the bridge, unless the pipe connection to the locking bolts breaks.

The bridge coupler, by which the connection between the rods on the draw and those on the fixed spans is made or broken, is shown in both positions. Lugs *a*, on the ends of one set of rods, engage in slots *b* on the ends of the other set. In this position the connection is made from the cabin to the signals or derails. Pulling over the coupler lever in the cabin raises the arm *A* and so disconnects the pipes. This arm carries rollers, above and below the rods, as shown. Raising the arm *A* allows the lock *B* to come into position, by the fall of the counterweight, to lock the rods on the fixed spans against any movement. Thus the signals are locked to danger when the pipe connection is interrupted, and before the bridge rails, or the bridge itself, can be unlocked.

Cantilever Motor Truck.

This truck is designed to prevent the oscillating motion of electric motor cars, and also to strengthen the ends

of car bodies by providing additional support at each end. The main double side bars *BB*, which support the springs, are supported at their extreme ends by the cantilever trusses *CC*, which are hung from the journal boxes by means of malleable iron yokes, to which the main bars, are firmly united. The motors are flexibly suspended from overhead by the motor hanger *D*, and can be disconnected when desired by the removal of one nut. The centre portion of the main side bars, can be easily removed (when it is necessary to remove armatures for repairs) without disturbing the motor hanger. The brakes are applied to all four wheels, and are operated by compound brake levers that can be operated instantaneously, and require but little power.

The wheels are provided with malleable iron hubs, which are forced on the axles at a pressure of 35 tons to prevent their becoming loose. The wheel webs are interchangeable, and can be renewed by any ordinary workman without the aid of special machinery and without removing the motors from the axles. Tubular rubber cushions are inserted between the hub and web, and support the axles and motors and relieve them from shocks.

The trucks (unless otherwise ordered) are equipped with the dust-tight journal boxes designed by Mr. F. S. Adams, Master Car Builder of the Boston & Albany Railroad. The axles are constructed of fibrous steel, and provided with enlarged bearings and screw-threaded collars.

This form of truck was patented in January, 1890, is made by the Peckham Street Car Wheel & Axle Co., of 239 Broadway, New York, and is already in use on the electric roads in Cleveland, O., and Lowell, Mass.

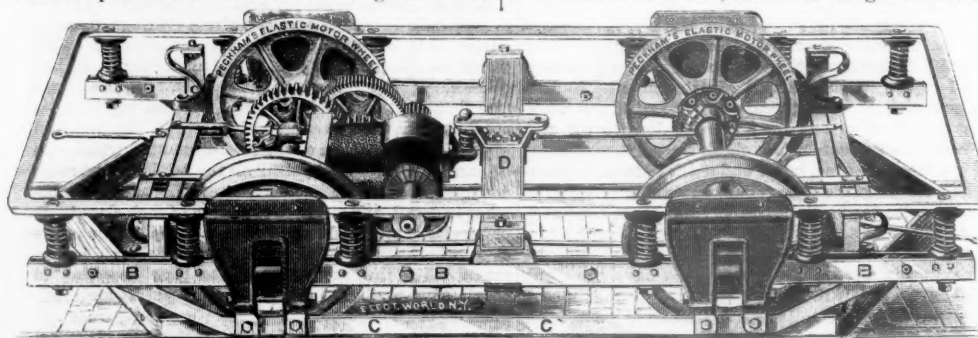
The Westinghouse Draw Gear.

Saturday of last week an exhibition was made on the Lake Shore & Michigan Southern tracks, near Chicago, by the Union Switch & Signal Company, of the Westinghouse double acting, friction buffer, draw gear. A special train left the Lake Shore station at 2:15 and returned to Chicago at 5 P. M. The party consisted of representatives of all the prominent railroads in the vicinity of Chicago. The visitors came with the determination to test the apparatus for all it was worth, and the experiments were repeated many different times. The test train consisted of about thirty standard Pennsylvania box cars. They were not loaded, and were equipped with the Janney coupler and the buffer above mentioned.

The first test consisted of reversing the engines, of which there were two, at the head of the train, the brakes being set on the rear cars. In this exhibit the action of the friction plates could be readily observed, both in pulling out and in backing up. The violent reversals of the engines were sufficient to close the draw gear until the flanges of the draw heads came in contact with wrought-iron plates on the end sills, and in pulling out to compress the buffer spring almost to the limit.

The second exhibit consisted in cutting the train in two and setting the brakes on the rear half. The cars were then driven together with great violence, the blow being sufficient to drive the flanges of the draw heads against the end sills. During the test no parts were broken, and the device withstood the blows admirably.

Great interest was manifested by all present in the operation of the friction buffer. In order to enable the visitors to clearly comprehend the construction of the device, a full sized buffer, together with the car sills, was mounted in a passenger car from which several of the seats had been removed to make room for it. Recently this draw gear has been much improved. Its object is to provide an elastic resistance greatly in excess of the capacity of the ordinary draft spring, thus reducing the shocks which are transmitted to car bodies and frames, decreasing the frequency and cost of repairs, and prolonging the life of the structure. The friction device is double acting, and to compress it by either a



CANTILEVER MOTOR TRUCK.

push or a pull requires about 10 times as much work as to compress the ordinary freight draft spring.

This form of draw gear offers an excellent opportunity for the introduction of continuous draw-ropes, and a portion of the cars in the test train are equipped with them.

From Chicago the experimental train proceeds eastward over the Lake Shore and West Shore roads to Cleveland, Buffalo, Syracuse, Albany and New York, at which points other tests will be made. The train is in charge of Mr. R. H. Soule, General Agent of the Union Switch & Signal Co., and a corps of competent assistants.

Recent Improvements in Pullman Cars.

In the illustrations, figs. 1 to 4, are shown some improvements in the framing of the ends of Pullman cars, designed by Mr. H. H. Sessions, Manager of the works at Pullman. This construction is now being used on all the latest Pullman cars. It has two distinct parts. An angle-iron end frame passes around the whole end, as shown in figs. 1, 2 and 3. This angle iron is secured to the sills by a knee of bar iron. It passes up each side of the car, is bent to conform to the shape of the roof, and joined at the top. The angle iron for the ordinary car is 3 in. \times 4 in. \times $\frac{1}{2}$ in. To this angle iron is securely fastened all the corner trimming, as indicated by the holes through the web of the angle in fig. 1. The top plate, as well as the monitor rails, is secured to the angle by knees and bolts.

The other part of this construction consists of a horizontal truss plate 20 in. wide \times $\frac{1}{2}$ in. thick. This plate tapers off at the end to 12 in. in width, as shown in fig. 2. It is placed underneath the end sill, and extends the entire width of the car between the sills and the draft timbers. The plate is secured to the end sill by an angle iron 3 in. \times 4 in. \times $\frac{1}{2}$ in., as shown.

The object of this construction is to prevent the side of a car from spreading and the car from splitting open after the end sill is broken in the case of a collision. The sills are all securely bound together by the transverse truss plate, and the frame is greatly strengthened against the effects of a collision.

Plans are also given of two different cars, showing the arrangement of lavatories, etc., recently adopted. In each case the central portion of the car is not shown, as the arrangement is not different from the ordinary. The important feature in the modification of the plans consists in shutting off the men's toilet room from the passages and the body of the car. It will be seen that they are entirely secluded, except from the smoking room, and that an increased number of basins is furnished. A few cars arranged according to these new plans are now running on the Pennsylvania, and it is said that all the cars built in future will be arranged in this way. Several of the old style cars have been sent to the shops to be remodeled.

The improvement in the arrangement of curtain rod, which is also to be used in the new cars, was shown in our issue of last week.

Other improvements in Pullman cars are going on. One of the latest is several cars which are being fitted with a recessed end. The cars are combination parlor and sleeping cars, and each is designed to be the last car of the train. One end is vestibuled, and the other has an open platform which is made larger than usual by setting in the end of the body about 4 ft. This reduces the floor area of the parlor by just the amount which it enlarges the platform. The parlor occupies about one-third of the length of the car, and has bay windows along each side. The end partition which separates the parlor from the platform has two large windows in it, so that a good view can be obtained from this room. The sides and roof of the end of the car are exactly as usual, and there is room, therefore, for a large window in each side of the car at the platform. The steps will be covered, while the car is in motion, with drop doors, and side gates will be fitted in the same manner as many private cars are equipped. A perfectly safe platform, the full width of the car, and about 7 $\frac{1}{2}$ ft. long, a large portion of which is protected from wind, is thus provided in connection with the parlor.

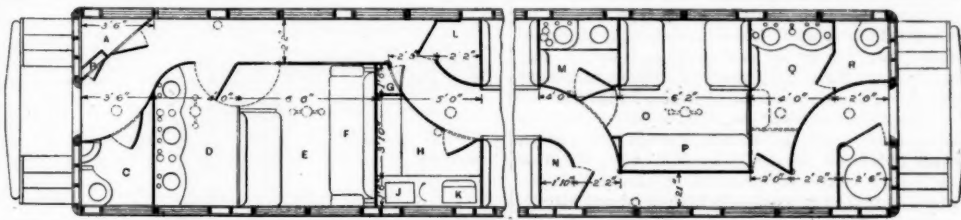
Hydraulic Forging and the Flow of Solids; Notes Suggested by Alleged Defects in Certain Forgings made by Pressure.

II.

BY COLEMAN SELLERS, E.D., PROFESSOR OF ENGINEERING PRACTICE, STEVENS INSTITUTE OF TECHNOLOGY.

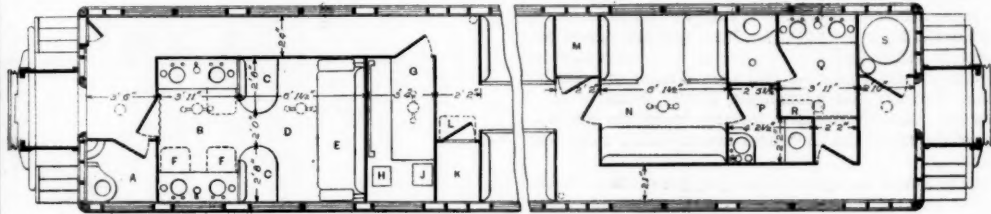
In comparing the operation of the forging press with the action or result of the direct-acting steam hammer, I will use a term not in common use in this relation. I prefer to call the action of the press or hammer one of "deforming," as expressive of the change of shape incident to pressure or blow. In the examples already published in the *Railroad Gazette* [Aug. 2, 1889], in its abstract of my lecture on Hydraulic Forging, delivered at the Stevens Institute of Technology, mention was made of the power required to effect change of form by one or the other method.

Long preceding the experiments quoted, trials were made in a large bloom shear, rigged for this experiment as a squeezer, to measure the force required to produce any given amount of "deformation" of shape, and this line of experiments indicated that steel in a condition of



(67 ft. 2 in. over car body.)

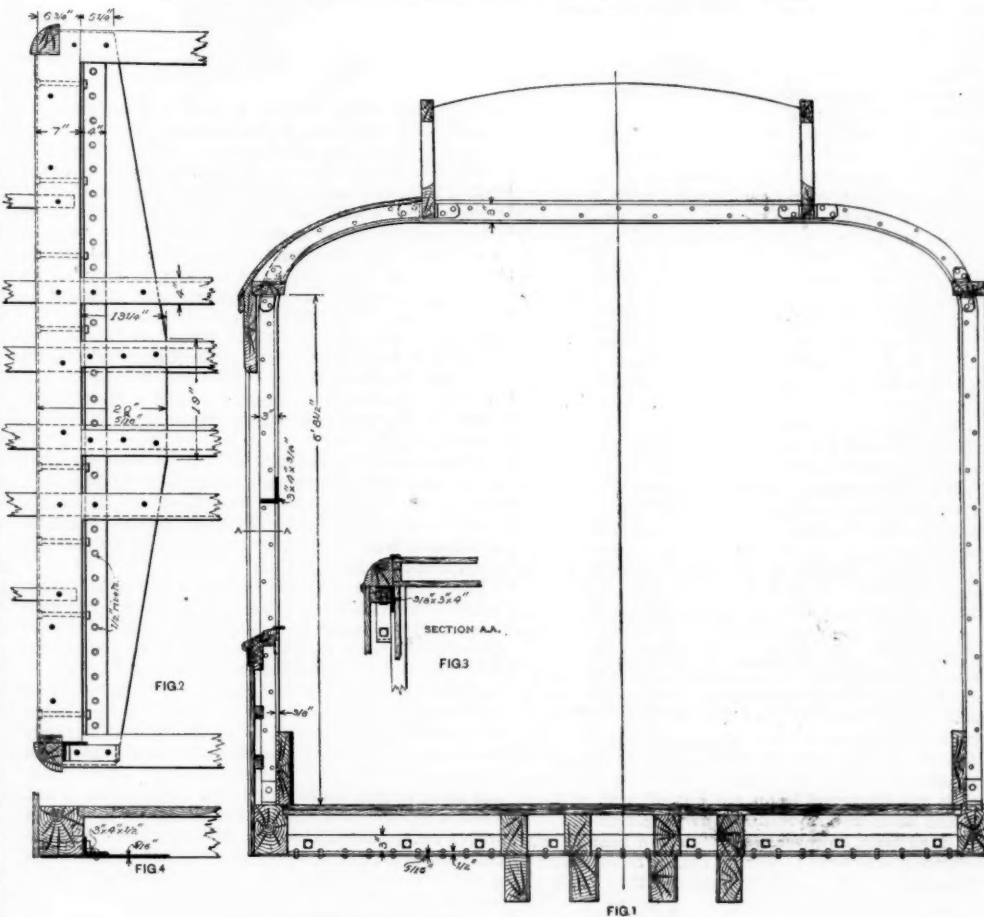
A, locker; B, fire tools; C, men's closet; D, men's toilet; E, smoking room; F, double sofa; G, book-case; H, buffet; J, sink; K, urn for coffee, etc.; L, locker; M, annex to drawing room; N, locker; O, drawing room; Q, women's toilet; R, closet.



(67 ft. 8 in. over car body.)

A, men's closet; B, men's toilet; C, seats; D, smoking room; E, double sofa; F, drop seats; G, buffet; H, sink; J, urn for coffee, etc.; K, locker; L, drop seat; M, locker; N, drawing room; O, women's closet; P, annex to drawing room; Q, women's toilet; R, drop seat; S, heater, coal below.

RECENT PLANS OF PULLMAN DRAWING-ROOM SLEEPING CARS.



TRUSS PLATES FOR END SILL AND CORNER POSTS.

PULLMAN'S PALACE CAR CO.

bright yellow heat took about the same force to "deform" as ingots of cold lead of the same size. The after experiments, comparing the press and power with the steam-hammer and its power, were tried with lead to avoid the errors due to uncertain heats. A press was used that had more than enough power to crush the ingot into a thin sheet at one operation, but its action was limited, and note was made of the power that was required to effect the same amount of deformation as was consecutively obtainable by the use of a steam hammer striking nearly uniform blows.

So far as the steam hammer is concerned, we have been led to rely on the old rule, founded on experience, that the weight of the falling mass in the steam hammer should not be less than 80 times the square of the diameter of the shaft to be forged. One long used to considering the steam hammer, and its scope of useful effect, may not think of the rule in advising the weight required for any given purpose, as examples of good practice fill his mind with the necessary data. The $2\frac{1}{2}$ to 3-ton hammer is used for forging locomotive axles, and $8 \times 8 \times 80 = 5,120$ lbs. would indicate $2\frac{1}{2}$ tons as the lightest hammer for an 8 in. shaft. While for a shaft 4 ft. in diameter the same rule ($48 \times 48 \times 80 = 184,320$ lbs.) would point to a 90-ton hammer as none too heavy, and indicates the limit of the capacity of the great 100-ton hammer at Creuzot in

France. The first cost of such a hammer, the space it occupies, the care to be used in its erection, with its many hundred tons of metal in the anvil block, point to the need of accomplishing the same result in some more economical way, particularly when the disturbance of the ground, and the shaking of surrounding machinery is to be felt at each blow of this great mass falling say 15 ft. or less.

As pointing to the value of a blow without shock and allowing time for the penetration of the force to all parts of the metal between the hammer and the anvil face, we may note that it has been long an accepted belief that a heavy hammer with short fall will penetrate more deeply the mass acted on, producing more nearly the same result on the anvil side of the forging as on the top, than a lighter hammer falling a greater distance, even if the calculated dynamical momentum be the same in both cases.

When a faggot or pile at a welding heat is placed under a hammer, very light taps must be given to solidify the surface and prepare it for the heavier and more penetrating blows. Double-acting hammers, that by reason of steam above the piston can be used as squeezers, are appreciated for their utility in compacting the pasty mass by pressure. With our knowledge of what is really required in the matter of a forging hammer, it is not surprising that we find the ideal ham-

mer, one of enormous weight and very short stroke, in the new forging press of the Whitworth type.

The hydrostatic press of Bramah, driven by pumps of sufficient power or by an accumulator, is one of continued action until the compressed mass offers resistance equal to the power of the actuating force. In the account of the comparative power required to deform steel by means of a direct acting hammer, and the power press, as already published in the *Railroad Gazette*, the press used as I have before said, like the press of Bramah, had power to make the total deformation at one stroke, which by the hammer required a number of blows. The Whitworth and other forging presses driven by pumps actuated by a steam engine with heavy fly-wheel have not the power of continued action, but like the steam hammer in which the momentum is absorbed in the mass it falls on, the force in the press of the moving mass in the fly wheel of the engine, is absorbed, and the power is exhausted in a measure, with each limited amount of "deformation" of the metal acted on. In the steam hammer the momentum of the falling "tup" does the work; in the new forging press the momentum of the rim of the fly wheel accomplishes the same result.

The power of the hydraulic forging press can be made to meet any requirement at less cost than a steam hammer to accomplish the same work for all sizes above, say ten tons, and perhaps even below that weight. The stroke required can, as in the Whitworth press, be the result of a movable cylinder and ram of short stroke, arranged to rise and fall in adjustment to the work, or by a stationary cylinder and long stroke of the forging ram. The motion of the ram can be made quite automatic and more rapid in action than the steam hammer; the ram is made to touch the work by low-pressure water, and the moment the power of the low pressure ceases to act the high-pressure pumps, driven by the fly wheel do the work required within the limit of the allowable reduction of speed in the engine and the advisable amount of "deformation" to be accomplished by each stroke.

What is accomplished by the hydraulic forging press on masses of great weight can be done, with small objects, in many of the known power presses, one example being that used by makers of hammers and sledges. These manufacturers employ a geared press with solid bed plate, upon which a succession of dies are bolted. A cross-head driven by eccentrics with the sufficient stroke, say from one to two inches, is also fitted with corresponding upper dies. A heated bar of steel, itself of good quality at moderate heat, is passed from die to die, and ends with a perfectly formed chipping hammer or sledge, neatly forged to exact shape, with no injury to the quality of the steel.

There are shapes required that cannot be produced in the manner stated, and such shapes are cast, by means of pressure, in forging presses that upset the bar into the required form, causing it to fill the die in its most intricate periphery. Sometimes two or more machines or separate operations in one machine are required to obtain the shape wanted—as the flatter and upsetter in bridge link work. It is in the use of such casting machines that metal may perhaps be so much overheated as to be granular from lack of work. If such be the case the remedy is in the use of more powerful machinery that will work metal at lower heat, or in dividing the operation into more separate processes. It is to be inferred that if a bar of good tool steel can be, with very little work, heated and made into a simple form without injury to the metal, the same thing can be done with more complicated forms, if the physical condition of the bar steel is not disturbed by an amount of heat without sufficient after work to restore it to perfection.

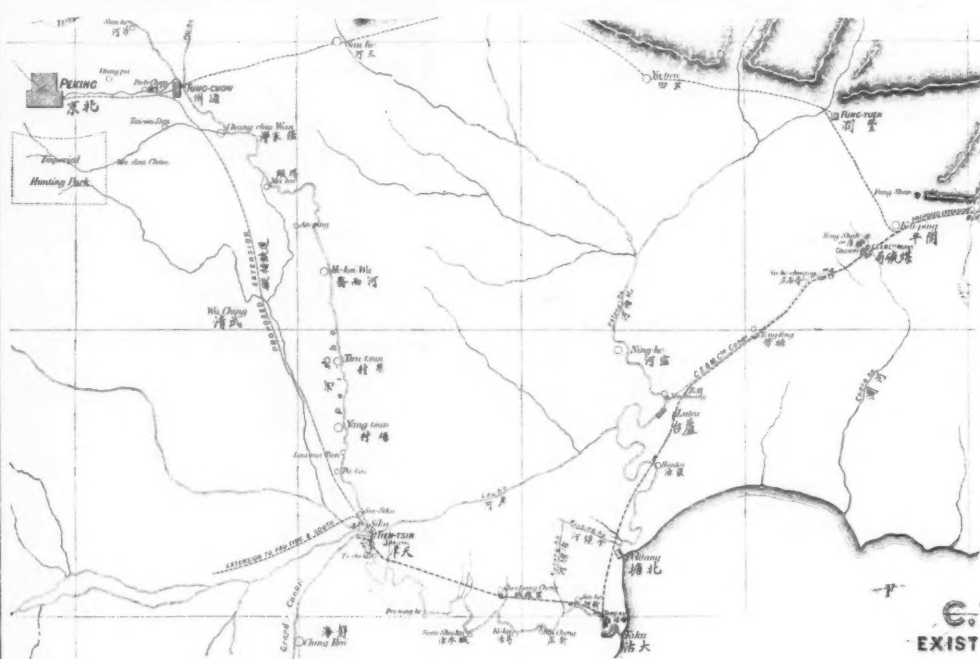
Let us suppose, however, that such low heat as will not demand afterwork to restore, cannot be used with a given machine and shape to be produced, then, perhaps, heating and cooling, with careful annealing or some other process, may give to the finished piece the required physical condition.

In my lectures, I gave the result of experiments as showing that, while a tire ingot may require from 12,000 to 15,000 lbs. pressure per square inch in the resulting force of a hammer blow, with the press from 4,000 to 5,000 lbs. per square inch will accomplish the same "deformation." Three thousand pounds per square inch will cause steel, at a good yellow heat, of considerable thickness as compared to surface, to flow under the pressure, when unconfined by dies that limits its extension in any direction sideways; yet to make the same metal fill a die of even simple form, and to bring up sharp corners, a power of from 16,000 to 20,000 lbs. per square inch is required, and for some complicated shapes a very much greater pressure than 20,000 lbs.

Hydraulic riveting machines are operated on a presumed need of about 18,000 lbs. per square inch as measured on the area of the upset head. Boilers riveted by machines have been injured by the application of more power than was really required to drive the rivet properly, the extra pressure acting on the cold metal being riveted to the enlargement of the circumference of the shell of the boiler at the seam.

We have every reason to believe that steel and iron are both improved by the operation of rolling. Rolling may be classed with hydraulic forging, or other pressure forging distinct from hammering. Rolling and slow pressure between dies are each methods of putting work on metal without hammering.

In review of the case we may consider as reasonably



Lines of the China Railway Co., China.

Approximate Scale, 1 in. = 25.6 miles.

certain that metal like iron or steel, once brought into good condition to shape in bars, blooms or slabs, can be forged or rolled into other shapes without harm and without very much work in the shaping process. In the case of iron, this may, of necessity, involve a heat sufficient to effect a weld; but we are not so sure that in the latter case the metal would not be the better for more work after such high heat. More work need not be by means of hammering or rolling; it may be by other processes. The subject is one demanding investigation. Note the arguments pro and con in regard to the value of welded boiler shells and the strength of the welded seam in thin plates. While we may trust without test the welded fire furnace that is to bear compression, we cannot yet trust a shell that is welded and submitted to internal pressure, without some test of strength.

A horse shoe is an example of iron or steel put uninjured into a new shape from a bar of good quality with little work. Steel and iron "eye bars" forged by hydraulic pressure in from two to three operations can be relied on to break in the bar, not in the eye, when torn apart in the testing machine.

I feel very sure that the largest direct-acting steam hammer has with wisdom been already built. The want for greater power will be most probably met in the near future by hydraulic forging machines of improved construction; by machines that will rival the hammer in rapidity of action when performing the same work as the hammer at a less cost in machinery and very much less cost in power required to do the work. The only time I had a chance to see the celebrated Whitworth forging machine in the distance, a large double crank was being forged, while but a few days before I had stood in a forge yard among the hundreds of tons of broken cranks and shafts that had given out from insufficient work, and was shown the broken forged crank of the most recent steamship, the forged crank having been replaced by a built up one. Perhaps most of the failures were from insufficient weight in hammers employed. When from the use of too light a hammer in forging large masses the surface only is sufficiently worked to improve its condition, that well worked part is lost in the machine shop by reason of the amount of metal removed in finishing; hence the need of a means of causing the force applied to be more than a merely superficial one. We want, and obtain by means of the most improved forging press, a penetrative force that will insure as uniform results within the mass as on the surface.

Sir Joseph Whitworth's idea of hydraulic forging, as explained to me by his superintendent and afterward by himself, in the case of steel forgings begins with his fluid pressure or pressure applied to the molten steel in the act of cooling. The merit of this process is not admitted by all metalurgists. He assumes that the centre of the ingot to be forged into hollow shafts and cylinder linings is not worth trying to save in solid form by the pot or "trepan" drill, used in the arsenal at Woolwich. In his large drilling lathe, which I saw in operation, his 48-in. ingot is rotated between two 6-in. fly drills, applied to the ends and forced up by hydraulic pressure and retracted in the same way, for clearing the chips and replacing worn bits which are loose in the drill stock.

His forging press is not so entirely automatic as it might be, and some skill is required to regulate the amount of "deformation" to each stroke of the ram. If any of his forged shafts failed in use it may have been from having made too heavy a bite at each stroke and so caused check marks that start cracks. But I have

failed to find authentic evidence of any failures. He, as well as others, have press-forged rings for heavy guns in a manner leaving nothing to be wished for, while oil tempering and other separate processes have vastly increased the strength and resistance of the pressed steel.

Had not low steel at low cost pushed iron to the wall for constructive purposes, a homogeneous iron was to have been made by a process of alternate rolling into a bar and recompressing into an ingot, the alternate operations being continued until sufficient work had been applied without much change in shape; the blooms so made to be afterwards rolled into beams and other shapes.

The collection of reliable data as to the output of the forging press under all conditions of its use, either as a hammer or a die forging machine, is one requiring time and careful sifting of the collected examples and information. I am now from time to time collecting such information, and I shall be greatly indebted to all who can help me, giving each full recognition in any use I may make of it in the pages of the *Railroad Gazette* or in my lectures.

The objections raised to hydraulic forgings will, I think, be found to apply only to those shapes forced up in dies. Those deficient in strength may have been made from metal not sufficiently worked to begin with, or made so hot, to save pressure, as to undo the effect of work already applied to the bar. So far as my observation enables me to speak with any degree of certainty, I can say that metal, die forged from good bars of iron or steel, at the same heat as would be applied to such bar in forging, will be good from the press. If spoiled in the dies, the remedy is in more pressure and less heat, or in after processes that will operate to the improvement of the stock without change of shape.

Railroads in China.

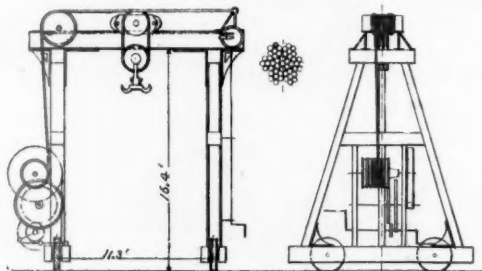
The sketch map of Chinese railroads given in this issue is reproduced from a map prepared in 1888 for the China Railway Co., successors of the Kaiping Railway Co. The existing lines are those from Ta-ku northeast to Kaiping and westward to Tien-tsin. The Kaiping line is about 76 miles long, and that to Tien-tsin about 38 miles. Proposed extensions are shown from Kaiping eastward, and from Tien-tsin to Peking, and also southwesterly. It is highly improbable that either of these will be built for a long time. The coast influences now predominant are dead against railroads, and, indeed, there is talk of taking up the rails of the Kaiping-Ta-ku line. Of course, it is very dangerous to predict anything regarding the railroad policy of China; but it is notoriously fickle, and the frequent reports that new line is building, or to be built, must be taken with much suspicion. The Kaiping line was begun in 1880, when Mr. Kinder built seven miles for the Chinese Engineering & Mining Co. In 1886-7 the line was sold to the Kaiping Railway Co., which built to Lutai. The company's name was changed to the China Railway Co. in 1887, and the line completed to Ta-ku. In the same year the Tien-tsin extension began, and it was completed in 1888. With the working and equipment of these lines our readers have been made somewhat familiar by the accounts published in 1888.

Axles for Heavy Tenders—Northwest Railroad Club.

At the last meeting of the Club the above subject was opened by a paper by Mr. W. H. Lewis, who said in part: We will first consider what an axle for this purpose is expected to bear, which, according to the explanations of the committee, should be for a tender with a water

ally the tackle is composed of four turns of link chains; each turn has then to lift from five to six tons. The link chains, and even the British chains, which have taken the place of the ordinary ropes, the wearing of which was too rapid, have several inconveniences, and sudden ruptures often take place and cause bad accidents, and give rise to inevitable damage.

Twenty years ago the Orleans Railroad studied the possibilities of the substitution of cables for chains, with a view of giving all security possible to the workmen



Wire Rope Crane—Paris & Orleans Railroad.

operating cranes. They began to use tackle with pulleys of 10 to 12 in. in diameter. The first trial made with a cable composed of five wires of .06 in. diameter was not economical, and the cable was soon unfit for use, regardless of all the pliancy that could be given it by means of a centre of hemp. They then augmented the diameter of pulleys and diminished the diameter of wire so as not to pass the limit of elasticity of the material, and very satisfactory results were arrived at.

The design herewith shows the type of cranes made in 1878. This type has pulleys 24 in. in diameter and a cable 1.48 in. diameter composed of seven large strands of wire rope, each of these strands having seven smaller strands of seven wires, or a total of 2,401 steel wires .02 in. in diameter. When of these dimensions, the steel cable works around the 24 in. pulleys under a stress of 23,696 lbs. per sq. in. of section, caused by the curvature of the pulleys in the part most subjected to bending, and under a pull of 18,003 lbs. per sq. in. of section. Thus, the metal works at a total of $23,696 + 18,003 = 41,780$ lbs. per sq. in. of section. The steel wires are specified to have a resistance to rupture of 170,680 lbs. per sq. in. and a limit of elasticity 99,560 to 128,000 lbs. per sq. in.

The cables used under these conditions last seven years, whereas the cables composed of wires .06 in. in diameter and wound upon pulleys of 10 to 12 in. diameter lasted but about 18 months. The crane cables do not work constantly, and this duration of seven years would necessarily be reduced if the cable worked continuously.

The cables used for transmission are made in a similar manner to the foregoing. The diameters of pulleys and wires are of such relative dimensions for this work as not to impose a stress exceeding 28,450 lbs. per square inch in the most fatigued part of the cable. This is an indispensable condition to success with cables.

Elevated Roads in Chicago.

The South Side Rapid Transit Company is actually at work on the Alley Elevated Road in Chicago. Ground was broken on Monday last for the foundations, which will be put in at the rate of ten foundations per day. Two forces of men are working in both directions from Thirty-third street, and the Keystone Bridge Co. is under contract with a forfeiture to complete one mile of the road by March 28. Col. Calvin R. Goddard, who has charge of the construction of the road, is giving his personal attention to the fulfillment of the contract at the time agreed. At the date the contracts were let, Jan. 11, everything was ready to proceed, and on Jan. 12 the rolling mill was started on the material for the road, and it is now well under way.

From the beginning this company has had a definite plan, and has followed it both in the courts and in the private settlements with parties along the line. As a result of this vigorous policy the right of way between Thirtieth and Thirty-fourth streets is now all in the hands of the company and paid for. Property was acquired both by purchase and by condemnation. Buildings on the purchased property are being sold for what they will bring, with the stipulation that they be removed within 48 hours. One house which in the judgment was rated at \$3,500 was sold for \$500.

The iron for the superstructure is now being rapidly manufactured. Large shipments are under contract to arrive Feb. 25, and the work of erecting is expected to commence the following day.

The stations so far located are at Twenty-sixth, Thirty-first, and Thirty-third streets. There possibly will be one located between Twenty-sixth and Thirty-third streets, but that has not yet been decided. Probably the road will go as far up town as Van Buren street.

Floods on the Pacific Slope.

The unprecedented snowfall on the Pacific Slope in January, followed by rains and rapid thaws, caused very serious floods and considerable damage. The Willamette and the Columbia rivers reached the highest stage known since 1870, and carried away considerable property in the way of buildings and smaller bridges, and the steel

bridge at Portland was very seriously threatened for some hours, owing to the fact that the draw was not opened while it was possible to open it, and drift accumulated against it. Bridges were carried away at Salem and Oregon City. Landslides along the Columbia River obstructed the tracks of the Oregon Railway & Navigation Co. and broke the telegraph line. On Feb. 6 the water began falling rapidly. The O. R. & N. (Union Pacific) established a steamer service from Portland to Cascade Locks, taking passengers and freight around the obstructed portion of the road.

The Union Pacific lost a bridge near Cascade Locks on the Columbia River under a work train. The foundation had been washed out, and the caboose and the tender fell with the bridge some 40 ft., but the engine got clear. Eight men were instantly killed. The line between Portland and the Dalles was finally opened Monday.

Railroad communication with San Francisco was also interrupted from washouts and landslides. The Southern Pacific lost a bridge at Ashland over the Umpqua River, and several smaller bridges between Portland and Ashland were carried away. A great many serious landslides occurred and the streams are said to have been higher than at any previous time for 30 years. It is estimated that it will take 1,500 men at least a month to repair the damages done to the track and roadbed between Roseburg and Ashland.

The railroads in the vicinity of Los Angeles suffered considerably from floods Jan. 26. Considerable work had to be done on the snow sheds of the Central Pacific after the blockade was raised, the enormous weight of snow having caused some of them to lean over dangerously. Trains were delayed by this work.

Form of Contract for Chilled Wheels—New England Railroad Club.

At the meeting of Feb. 12 the subject for discussion was the Master Car Builders' Association form of contract for chilled wheels.

The discussion was opened by Mr. J. N. LAUDER (Old Colony); I am not speaking now for the wheel makers. As I understand it, they wished to protect themselves in some degree against what might be called illegitimate wheel manufacture. It is a well-known fact by railroad men that a first-class wheel made by a reputable wheel manufacturer costs, we will say, in the neighborhood of \$10; it cannot be produced for much less than that and proper materials and proper workmanship put into it. We also know that wheels have been sold by some car-wheel manufacturers and to some railroads for prices very much below what would produce a safe and good wheel.

The problem is how to protect the railroad and the honest manufacturer of wheels against these cheap wheels. You may tie a car builder up as tight as you please to specifications, and unless you specify the make of wheel, it is of very little good, and even then the builder will manage in some way to buy his wheels at such a price that perhaps they are not quite up to the standard, even if they are made by a reputable wheel maker.

The Wheel Manufacturers' Association called upon the two national organizations, the Master Mechanics' Association and the Master Car Builders' Association, and committees were appointed to meet with the wheel manufacturers and see if they could formulate some plan whereby both parties could be protected against these cheap wheels. The Master Mechanics' Association appointed a committee of three, and also the Master Car Builders' Association appointed a committee of three, thus making, with six members of the Wheel Manufacturers' Association, a full committee of 12 members. I was one of the members on the part of the Master Mechanics' Association, and we had three meetings. I will read a portion of the report which we prepared and which was presented to the wheel makers and the Master Mechanics' Association for their consideration. I will only read that part which properly belongs to the discussion this evening, omitting the parts relating to specification for wheels and tests and only reading the part relating to form of contract between the wheel maker and the wheel user. [See pages 153-4 Master Mechanics' Association Report of 1888.]

Now, this report which I have just read was accepted. This was in the year 1888, in June, and this report was submitted to the Master Mechanics' Association, and was by them, after discussion, adopted unanimously. The Master Car Builders laid it on the table for one year. In June, 1889, the matter was taken up and thoroughly discussed, and it was voted to put it to letter ballot. It was put to the railroads and the letter ballot taken, and it was adopted, so that the railroads of this country recognized the justice and wisdom of the contract prepared by these three committees as a joint committee.

Why, since that time there has been no further effort to push this matter by the wheel makers I am unable to say, but it was only last year that a standard was arrived at. Now, of course, the standard adopted by the associations is not binding on any railroad except as they may choose to adopt it, but it has a moral binding force which ought to be regarded, and I think the railroad officials and purchasing agents would do well to consider this matter carefully, look at it in all its bearings, and I think they would come to the same agreement and the same conclusion that the Master Mechanics' Association have come to. I am aware that perhaps you could not figure out any saving in dollars and cents to the railroads by buying their wheels under this system. Take the Old Colony, for instance; we buy wheels for so much apiece and have a service guarantee. This service guarantee is absolute; if the wheels do not make their guaranteed mileage and are not rendered incapable of doing so by flat sliding, or sharp flanges, or other defects, the wheel maker is bound by his contract to give us a new wheel and take the old one away. They get nothing for all the mileage that wheel had done. Now, this is manifestly unfair, and I do not know why they submit to it, but I suppose because the wheel maker gives practically no guarantee to the freight car wheels.

This system would give the wheel makers an incentive to make the best possible wheel that they can even if the price that they get for the wheel was perhaps down very near to the cost price. If they can make a wheel that will exceed the guaranteed mileage, then they get everything over and above the guaranteed mileage, over and

above the price of the car wheel. Now, objections might be made, for it is an easy thing to get a wheel that will make a large mileage; but how about the safety? A wheel could be so made as to give a large mileage, but be a very unsafe wheel to run. This is provided for by the system of tests which was adopted with this form of contract. This form of contract for wheels would not only insure us a strong wheel, but a better wheel than we now get, because it is for the interests of the wheel maker to make a better wheel. It would bar out all cheap wheels; and none of us want to run cheap wheels, because of the danger in them. Now, as to the matter of methods under this contract, we will say that you contract for the wheel at \$10, you buy the wheel and pay the wheel maker, who guarantees 50,000 miles. Now, if the wheel makes 60,000 miles, we simply credit the wheel maker with the extra 10,000 miles. If this wheel made only 45,000 we should charge him with the 5,000. If it only made 20,000 we would charge him with the 30,000; if it makes 100,000 miles we credit him with the 50,000 miles over and above the \$10 that we gave for the wheel.

Mr. LAUDER then read a paper written by Mr. W. W. Snow, of the Ramapo Wheel & Foundry Co., which was, in part, as follows:

The changes in the specifications, from those that were submitted by the conference committees composed of master car builders, master mechanics and wheel makers, have been so slight that we will make no reference to them at this time. The changes made in the guarantee have been in some respects liberal, and the remarks of the committee as stated in the second paragraph, referring to the special purposes of this guarantee, are very satisfactory. We are certain that all wheel makers will appreciate the co-operation of railroad officials in assisting to raise the standard of chilled iron wheels.

We, however, regard the omission of wheels removed because of sharp flanges, from the list of those for which the maker is not responsible, as very severe; and we think there is apt to be much controversy over this point. A very large proportion of sharp flanges are due to other causes than the quality of the chill on the wheel. At a recent meeting of the Wheel Manufacturers' Association, the Master Car Builders' report was under consideration and it was recommended by that Association that where wheels are removed for sharp flanges the flange should be broken, and if the fracture shows a good bright chill, it shall be evidence that the flange wear was produced by other causes than those for which the wheel maker is responsible.

Referring to the proposed settlement, we would suggest that the form or table given on page 86 of the Master Car Builders' Annual Report is somewhat misleading. This table represents the comparative value of or difference between the high and low priced wheel. It is not a table by which settlements can be made, as it places no market value on the old wheel. To place the matter in its proper light, we would suggest a careful consideration of the relation of the scrap value of the wheel to the price of a new wheel. We find there are two items of value in a wheel. One is the scrap value, which must always be recognized in the new wheel as well as the old; this value is always about 45 per cent. of the cost of the new wheel. The other item of value is the service of the wheel in miles or months.

To illustrate a settlement on this basis:

Cost of wheel.....	\$10.00
Scrap value, 45 per cent.....	4.50
Service value.....	\$5.50

This service value—\$5.50—is guaranteed to equal 60,000 miles in service performed. We therefore find the cost to the user to be of \$5.50, or 9½ cents per 1,000 miles of service. It is quite evident that this 9½ cents per 1,000 miles of service should be the basis of settlement for a wheel costing \$10.00, and the table, as presented in the report, should be adjusted to the facts as already shown.

The following table represents the scrap and service value, together with the proper contract rates for the settlement of mileage for wheels costing \$11, \$10, \$9 and \$8, respectively:

	\$11.00	\$10.00	\$9.00	\$8.00
Cost of wheel.....	11.00	10.00	9.00	8.00
Scrap value, 45 per cent.....	4.95	4.50	4.05	3.60
Service value, 55 per cent.....	6.05	5.50	4.95	4.40
Basis of settlement for short mileage under guarantee of 60,000 miles given in cents per 1,000 miles.....	10½	9½	8½	7½

The above table corresponds with the method of computing the cost of wheel service as suggested by the Wheel Makers' Association.

Mr. LAUDER said, having concluded Mr. Snow's paper, Now I fail to see wherein there is any injustice in this method of buying and selling wheels. You pay for what you get and the wheel maker gets the value of his material, and the better wheel he makes the more it is for the railroad's interest to give him what he should have for it. It saves changing the wheels so often and you will get better service; it saves refitting also.

Mr. J. W. MARDEN (Fitchburg): I would like to take a wheel that costs \$10 and one that costs \$8, and have both make 50,000 miles, and ask which is the cheaper?

Mr. LAUDER: The \$8 wheel is cheaper. If you get a wheel that will run 60,000 miles for \$8, of course you will buy it. If you can get some one to give you a wheel that will run 60,000 miles, you will take it provided it will stand the test. I would say there are no figures named in this form. That is a matter left between the purchasing agent and the wheel maker. There is no limit to be placed on the price of the wheel. It only makes this difference, that whatever price is fixed, it fixes a basis to make your settlements on. As I read before, a \$10 wheel costs about 10 cents a 1,000 miles, and if you can buy that wheel and get 60,000 miles out of it for \$8, of course you are getting it for something less than \$10.

Mr. MARDEN: I believe that the best wheel that the company can buy is the cheapest wheel for it to use, and if it costs actually \$10 to make a good wheel, I don't believe that a railroad company buying one for \$8 is going to get a good wheel. I believe that roads had better pay \$12 per wheel for a first-class article, and have it made by a reputable maker who will use the best of material, and not only use good material, but will have the judgment to distribute that material in the best possible manner in the wheel.

As to the contract, as adopted by the Master Car Builders' Association, I believe with Mr. LAUDER that it is a fair and equitable way of settling between the wheel makers and the railroad companies, and the Fitchburg Railroad adopted that method of settlement immediately on its suggestion, and we have used a similar

method before it was adopted by the Master Car-Builders' Association. I can hardly agree with Mr. Lauder as to the standards adopted by the Association. I believe that since the reorganization of the Master Car Builders' Association and the appointment of representative members by the different roads, who are authorized to go there and cast the vote of the road, a standard adopted should be binding, and I believe it is binding upon the roads to use that standard as far as practicable on the rolling stock that they own.

Mr. J. A. SHINN: There has been one point not dwelt upon and one supporting this system, and that is the element of cost of changing the wheels. Taking a \$10 wheel, by this contract, as illustrated by Mr. Snow, there is \$5.50 wearing value in the wheel. I have asked a number of times what it costs to change a pair of wheels and I have been told that it figures out 75 cents or \$1.25. I would like to ask whether that is the actual cost of changing a pair of wheels? If a car gets a bad wheel 100 miles from the shop, what is the expense of bringing a car in. How often do the cars have wheels changed within an hour after the car is ready to have them changed? Are there not sometimes days lost, and do not even weeks elapse before the car is brought to the shop, when it is lying on some side track at a cost, as has been estimated, of 50 cents a day to the company. Now, if the average expense of each car to the company is \$2.50 of changing the wheels, that \$2.50 is a fixed charge. If the guarantee was 50,000 miles and the value is \$5.50, and the pair of wheels made 25,000 miles, it is obvious that that \$2.50 has got to be charged in, and one-half of it is covered by the 25,000 miles it does not make. That has got to be made up and taken into calculation. Now, if this man makes a wheel that carries you 100,000 miles he is as much entitled to that \$2.50 as he is to any other credit. It is part of the value of the wheel. It is \$5.50 plus this unknown quantity, or it is \$5.50, minus this unknown quantity, and I think in a year's time the sum to the wheel maker would amount to a very large aggregate.

Mr. MARDEN: The point Mr. Shinn makes is well taken, and I think that the expense of changing the wheels varies much with the conditions as he states. It is not only the actual expense of labor of changing, but, as he says, the car has got to be hauled perhaps 100 or more miles to the shop, and more than that, it has got to be out of service a certain number of days, as he stated, and all that enters into the cost of changing the wheel. That only goes to show that it is economy for the roads to buy the best possible wheel without regard to expense.

Mr. CURTIS: If I had to charge up any number of days to the wheel maker on account of cars lying idle, he would soon want to get out of the business, that is, at the rate of fifty cents a day. In the first place, the wheel maker claims that his profit is not more than fifty or seventy-five cents on the chilled wheel. Where would the profit be at that rate? I think, undoubtedly, that the mileage system of paying for wheels would be an advantage both to the railroads and the manufacturer; but if you were going to take in the cost of exchanging, and delays, and things of that nature, you will not accomplish much.

Mr. LAUDER: I do not think we need to trouble ourselves very much, or enter into this matter of the cost of changing wheels to any extent. Any system of this sort that might be put into force must be made as simple as possible, and I believe the cost of changing wheels would regulate itself; that is, I believe if this system should come into use, that wheel makers would make wheels that would give more than their guaranteed service. If a wheel will make 20,000 miles in excess, the road simply pays for that, so there is no danger of their taking the wheel out, as there might be under the present system, to beat the wheel maker. I don't say that any railroad would do it, but under the present guarantee I have known railroads to steal the cars of other roads and paint them over and mark their names on them.

Mr. F. D. ADAMS (Boston & Albany): You needn't look at me; I didn't do it.

Mr. LAUDER: I didn't suppose any railroad would do it; but the road that would paint some other fellow's cars and put his name on them would probably do that. Under this system there is no object in doing that, because we simply pay for what we get. We pay for all we get and we do not pay more.

Mr. CURTIS: I think there is no make of wheels for the Old Colony that, throwing aside slid wheels and cut flanges, will not average over 40,000 miles on passenger service. I will say also that wheel makers are not very liable to criticize what is returned to them. They will take whatever we give them in the way of returned wheels.

Mr. ADAMS: While I am ready to agree with Mr. Lauder in the general character of the contract, I never looked upon it as being very likely to be followed out in detail by the parties purchasing wheels, and I am quite surprised to find even one road that is doing it. I do not know but there may be a great many roads doing it, but the Fitchburg is the first road I have ever heard of as buying its wheels under this contract. I am not prepared to say that it is not the best thing that could be done. I presume it is as good as could be done, and I think it would be perfectly fair to both parties, the makers and the railroads, if it could be done in that way. The purchasing agent wants to have his way in purchases, and he stands right in the path of the adoption of such a plan. I do not believe in the process of testing that is used on the wheels of the Pennsylvania. I would rather buy a wheel of a man whose wheels I knew were reliable, and take my chances and not test any of them. On our road we never test a wheel or axle, and yet I would venture to say you cannot bring forward a road in this country that has less broken wheels and axles than has the Boston & Albany.

Mr. S. D. NYE (J. S. Heartt & Co.) said he had been manufacturing cast iron wheels for 32 years, and that manufacturers had grown utterly tired of the practice of returning wheels which had run 49,000 miles on a guarantee of 50,000 service. He thought manufacturers should be paid in such cases. He declared that the Old Colony and the Boston & Albany were using wheels that had made 70,000, 80,000 and even 95,000 miles, and were still in service.

Mr. ADAMS: For 16 years the Boston & Albany on its passenger cars has used nothing but steel wheels.

Mr. NYE: You are mistaken; I have furnished you cast-iron wheels for your passenger cars within 16 years.

Mr. ADAMS: There has been no record of iron wheels used by us since this Club was organized. Possibly we have given you a record of wheels that were used before at a certain time; but I know we were ordered by our President to take out all iron wheels before I came to Allston, and I have been here 12 years.

Mr. NYE: Now, I say if you will treat the wheel makers as well as they treat the railroads, I think the wheel maker would have a little profit at the end of every year. The railroad men are all good fellows, but if you will

give us credit for what mileage we do make and charge us for what we do not charge, I will say to-day, as a cast iron wheel maker of 32 years' experience, that we shall have more money by more than 12 per cent. than we have to-day.

There are but very few wheels that we make to-day that run less than 30,000 miles. They are all up in the 30's and then they crawl up slowly to high figures. If you will buy a wheel, as every man connected with wheel making knows, at \$8.50 instead of buying my wheel at \$11, you will find that you have a defective wheel; you only buy it because it is round and has a hole in the centre. Again I say, if you will give us credit for what our wheel makes and charge us for what the wheel does not make, I will make more than though I sold them right out at so many miles' guarantee.

The subject for the next meeting is "Freight Car Couplers."

TECHNICAL.

Locomotive Building.

The Boston & Albany has just added eight new Baldwin locomotives to its equipment.

The Canadian Pacific has finished seven large locomotives for service on the Western Division. Orders have been given for the construction of 17 more engines.

The Schenectady Locomotive Works have just delivered an engine to the Connecticut River road.

The Iowa Central has received a number of locomotives from the Baldwin Locomotive Works.

H. K. Porter & Co., of Pittsburgh, are building an unusually large number of light locomotives for steel works. Engines are under way for Wheeling and Pittsburgh concerns, and for the Carnegie works at Homestead. Street motors are being built for Tacoma, Port Townsend and other points.

Car Notes.

The Duluth, South Shore & Atlantic has just put on three new and elegant Wagner sleeping cars, embodying all the latest improvements. The cars will run between Duluth and Mackinaw.

The New York, Pennsylvania & Ohio has just placed an order for 50 more 30-ton coal cars. This makes 1,000 ordered during the past few months, 900 being 30-ton cars, and 100 being 25-ton cars. The company to which the contract was awarded has an option for 500 more cars.

The Georgia Pacific has received 50 more new cars from the United States Rolling Stock Co., at Anniston. The company is building 50 more of these cars for the Georgia Pacific which will be delivered shortly.

The first of a lot of new combination mail and baggage cars being built for the Birmingham Mineral, at the Decatur shops, has been delivered to the road.

The first consignment of ten new Pullman sleeping cars for the Northern Pacific road has been received and others will be received in few days.

Work has been commenced by the Central of Georgia on 200 new freight cars at its shops at Macon, Ga. Several new passenger coaches are nearly completed.

Twelve of the cable cars on the Brooklyn bridge are to be sold and replaced by new and heavier ones.

The Evansville & Terre Haute is having built the cars for two vestibule trains for service between St. Louis and Louisville.

The Northern Pacific has ordered 1,000 freight cars from the Barney & Smith Co., and 500 from the Peninsular Car Co. The former will be equipped with Janney couplers, the latter with the Gould coupler.

The Texas & Pacific is building a number of new passenger cars at its shops at Marshall, Tex.

The St. Louis & San Francisco has received two handsome passenger cars from the Pullman shops.

The Corey Car & Mfg. Co. is building for the Canadian Copper Co., of Sudbury, Ont., 50 dumping cars with steel boxes, standard gauge, with 33-in. wheels.

The Pullman Palace Car Co. has completed a lot of new standard Tiffany cars for the Minneapolis Stock Yards & Packing Co. for dressed beef service.

Bridge Notes.

Proposals are asked by the County Auditor until Feb. 26 for erecting the superstructure of the Rich Street bridge over the Scioto River, at Columbus, O.

Proposals are wanted for the erection of several county bridges at Comanche, Tex.

Contracts have been awarded to Grant Wilkins, of Atlanta, for the erection of three spans of a steel bridge over the Oconee River for the Central of Georgia and for building one combination span of 200 ft. over Little River, on the Middle Georgia & Atlanta.

The Vermont Valley road has nearly completed a bridge across the West River, at Brattleboro, Vt. The bridge is a pier-jointed, half-deck structure, having a main span of 202 ft.

A new bridge is being constructed by the Cape Fear & Yadkin road over the Deep River, at Egypt, N. C.

The contract has been awarded to Nolan Bros., of Reading, Pa., for building a bridge for the Harrisburgh Terminal across the Susquehanna River at Harrisburgh. The new bridge will be built about 100 ft. below the piers of the unfinished South Pennsylvania bridge. It will consist of 23 piers with an elevation of 40 ft. above the water.

The Cable City Bridge Co. has been organized to build a pontoon bridge over the Arkansas River at Pine Bluff, Ark., at a cost of about \$30,000.

A company is being organized at McKeesport, Pa., to build a bridge across the Youghiogheny River, between McKeesport and Lincoln township.

Grandy Bros. have the contract for building two bridges over the Reedy River, one at the site of the Watkins Bridge, above Greenville, S. C., to be 51 ft., and other over the Carolina, Knoxville & Western, to be 120 ft.

The county commissioners, Colonnade Building, Nashville, Tenn., have asked for bids for building a highway bridge, and the substructure and approaches across Stones River, at Couch's, in the third district of Davidson County, Tenn.

The City of Lyons, Ia., has voted a tax of \$40,000 to aid in building a highway wagon bridge across the Mississippi River.

The contract for framing the bridges for the Qu'Appelle, Long Lake & Saskatchewan has been awarded to the Royal City Planing Mills, of New Westminster, B. C.

The City Council of Baltimore proposes to bridge Monroe street over the tracks of the Western Maryland and Baltimore & Potomac roads.

The Missouri Valley Bridge & Iron Works, of Leavenworth, Kan., has been awarded the contract for building the new Chattahoochee River Bridge, near Atlanta, Ga., by the county commissioners. The contract price is \$13,400. The bid of the Atlanta Bridge & Axle Co. was \$13,440.

The bridge over Turnbull Creek, on the St. Louis division of the Nashville, Chattanooga & St. Louis, has been completed. The bridge over the Stones River, on the Lebanon division, is reaching completion. The Louisville Bridge Co. has the contracts for the bridges.

The Central of New Jersey, has awarded the contracts to build a new four-track iron bridge at Point of Rocks near Jersey City, N. J., to J. O'Reilly for the stone abutments and the mason work, and to the New Jersey Iron Works for the iron work. The cost of the bridge will be nearly \$50,000.

A bill has been introduced in the Maryland Legislature to authorize Howard County to issue \$7,000 of bonds for rebuilding bridges.

The Canaca Atlantic's steel bridge over the St. Lawrence River at Coteau Ldg., Que., has been opened for freight traffic. It has occupied ten months in construction. There are 17 fixed spans, one of 139 ft., two of 175 ft., ten of 21 ft. and four of 223 ft. each, while the swing bridge is 355 ft. long. The islands that intersect the bridge are Giroux Island, 905 ft., and Round Island, 1,220 ft. The whole structure is a mile and three-quarters in length, and was described in these columns last October.

A survey has been made of a site near Natchitoches, La., for a proposed drawbridge over the Cane River.

The Salem Development Co., of Salem, Va., is having plans prepared for several iron bridges to be built across the Roanoke River to its property.

Congress has passed the bill authorizing the Iowa & Nebraska to build a new bridge across the Missouri River between Council Bluffs and Omaha.

The Senate Committee on Commerce has ordered an adverse report on the bill authorizing the construction of a bridge over the Detroit River at Detroit, Mich. The bill provides for a channel span of 1,000 ft., the structure to be 140 ft. above high-water mark.

Manufacturing and Business.

The Pennsylvania Railroad has given an order for a second trial lot of Davies spikes and Servis tie-plates. The latter are to be made 6 in. wide.

The Pond Machine Tool Co., through its selling agents, Manning, Maxwell & Moore, 113 Liberty street, New York, has received an order from the Ordnance Department of the United States Government for ten large lathes, for the work of turning, boring and finishing guns of 8 to 12 in. calibre. The contract amounts to \$247,800. The time of delivery extends over a period of about three years, so that the Pond Machine Tool Co. will be able to do its regular work promptly.

The annual meeting of the Springfield Emery Wheel Manufacturing Co. was held in Springfield, Mass., recently. E. R. Hyde was elected President; D. T. Hoeman, Vice-President; George W. Jackman, Treasurer, and O. H. Hyde, Secretary. The company was organized last October, with a paid up capital of \$150,000, and succeeded the Springfield Glue & Emery Wheel Co. The company is building factories at Bridgeport, Conn., which will be completed in March.

The Scarritt Furniture Co. has completed a large order for chairs for the Mexican Central, seats for four coaches for the Chicago & Alton, chairs for five new Missouri Pacific chair cars, and also chairs for the Wabash.

F. A. Scheffler, formerly Superintendent and General Manager of the Erie City Iron Works, of Erie, Pa., has accepted the position of Acting General Superintendent of the Westinghouse Electric Co., of Pittsburgh.

Iron and Steel.

Thomas Carlin's Sons, of Allegheny, Pa., have bought the machinery in the works of the Columbus Steel Co., of Columbus, which have been idle for some time. The plant consisted of two 15-gross-ton open-hearth furnaces and the machinery for the production of blooms, billets and slabs.

J. S. Slagle, of Nimmick & Co., has been elected President of the Allegheny Steel Co., in place of E. L. Clark, who retains his interest. George Bolton is Vice-President of the Company, W. G. Park, Treasurer, and John W. Doubleday, Secretary.

The contract for furnishing steel boiler plates for certain naval vessels has been awarded to the Linden Steel Co. at its bid of \$20,860 for the plain plates. Under the contract the plates will have to be trimmed and flanged by the government.

The furnaces at Emaus and Temple, in Berks County, Pa., and the two Keystone furnaces in Reading are being repaired and rebuilt preparatory to being put in blast as soon as possible.

Power Transmission in Manufacturing Establishments.

In manufacturing establishments of any kind the means employed to transmit power from the engine are subjects of interesting and profitable study. Leather belts have always been looked upon with favor, and when properly cared for and chosen with due regard to the work to be done, give, in general, good results. In using such belts of great width, however, difficulty is frequently encountered, due to unequal stretching on the two sides. Repairs in the case of such large belts are always attended with appreciable loss of time. Cotton belts, according to the experience of some, have not always proved satisfactory, lacking durability, though performing well when first put in. Hemp ropes are extensively used for main driving gearing, and have several good features. Any increase in power to be transmitted can be provided for by simply adding to the number of ropes, and should one or several of them give way the chances are that nothing serious would happen, the remaining ropes temporarily sustaining the increased strain. The repairs, moreover, can be easily and cheaply made, and the percentage of slip is less than with belts. Low first cost is another point in favor of the rope system, and cost of maintenance, as shown by experience, is lower with ropes than with belts.

Analysis of Copper.

A series of articles has been commenced in the Engineer (London) on various methods of analyzing copper. Those who are interested in that subject in connection with bearing brasses and tubs should not fail to read them. The first paper appeared in the issue of Jan. 17.



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EDITORIAL ANNOUNCEMENTS.

Contributions.—Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and in their management, particulars as to the business of railroads, and suggestions as to its improvement. Discussions of subjects pertaining to ALL DEPARTMENTS of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.

Advertisements.—We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay, EXCEPT IN THE ADVERTISING COLUMNS. We give in our editorial columns OUR OWN opinions, and those only, and in our news columns present only such matter as we consider interesting, and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.

The Pennsylvania is taking out all spring-rail frogs as fast as they wear out, and has not purchased any new ones for some time. This is certainly surprising. If there is anything in track practice that has been held among the best-informed engineers and trackmen to be settled, it is that for main line tracks spring-rail frogs are more durable, much easier on machinery and rolling stock, and at least as safe as rigid frogs. The latest action of the Superintendents' and the Roadmasters' associations has been to recommend them unqualifiedly for main line, and the writers of authority on the subject are, we believe, quite unanimous in favor of them. We do not know the reason that has led to giving them up on the Pennsylvania, but should like to know; and we are sure that maintenance of way men would also like to know. In the absence of any explanation we should not credit the statement, but that we have it on high authority.

The wide variation in the fuel consumption of different locomotives doing precisely the same work is continually a matter of comment. So far as the evaporation of water by locomotive boilers is concerned one must admit that little information is extant which is reliable. The best proof of this lack of information is in the wide variations in the results. For instance, some locomotives with cramped steam spaces, and which have to be forced in service, show an evaporation of between 8 and 10 lbs. of water for each pound of coal consumed. Others having large steam spaces and of better general design than the first, and which have not to be so violently driven in operation, show an evaporation of only 5 lbs. of water per pound of coal; the results in each case being obtained by dividing the water used by the coal consumed. Throwing aside all differences possible by leakage, and loss through the overflows of the injectors, there still remains a large difference to be accounted for, and which in most cases is in favor of what would seem to be, in the eyes of experienced railroad men, the inferior boiler design. Perhaps the cause of the difference may not be so hard to find if recent developments in cases of locomotives having cramped water spaces be used as a foundation for argument. Several instances of this sort have recently been brought to attention in which a considerable percentage of all the water passing into the boiler was not evaporated, but passed into the cylinders in the form of vapor, the presence of which can only be discovered by careful watch of the top of the smoke stack during exhaust, and by the action of the indicator piston, and this only in extremely bad cases. Large amounts of water can thus pass through the boiler without being perceived in any way. Stationary engineers are well aware of this action, and they do not consider evaporative tests of boilers as satisfactory unless accompanied by accurate observation with some sort of calorimeter test of the character of the steam generated; particular-

ly do they consider it necessary in the case of comparison of water tube or other rapid circulation boilers with boilers having a slow circulation and large steam spaces. The locomotive boiler in use operates under conditions particularly conducive to the formation of a water spray which is taken up by the steam and carried over to the cylinders; and one of the pieces of apparatus which is most needed in connection with locomotive tests is a calorimeter adapted to locomotive work, to measure the actual evaporation rather than the apparent, which is that generally stated. This subject is one which has been well considered by the marine and stationary engineer in all countries, and by the railroad engineers in France, as is well shown by the locomotive designs at the Paris Exposition last year. In England and in this country this question needs more consideration. To appreciate this any superintendent of motive power having a variety of locomotives in use need only compare the ratios between the steam space capacity in the various locomotive boilers with the respective amounts of steam demanded per minute from those boilers. One case has recently come to notice where a change in the boiler dimensions reduced the coal consumption from two tenders full to one for the same run under the same general conditions.

It has not yet ceased to be a wonder that the railroads have succeeded so well as they have at numerous points in collecting demurrage. All wide-awake consignees at once press upon the car service agent the claim that they are entitled to demurrage on freight delayed in transportation. It is true that, legally, the railroads transport freight as promptly as they agree to or pay the damages, now as in the past; and it is also true that in all but a small fraction of cases the rates paid are equitably based on a just estimate of the actual average time consumed in transit. In a broad but true sense the loss by delays is allowed for in the price. If goods were guaranteed prompt delivery the price would inevitably go up, or, what is the same thing, would fail to go down when otherwise it would do so. But the consignee does not see this; he thinks of his individual loss of \$50 on some particular car instead of the economical result as a whole. It will do no harm, however, for the railroads to look at these individual losses more closely than they have done, and the remonstrances of consignees will, therefore, do much good. The railroad that has not some slipshod practices to weed out of the freight transportation department would be hard to find. The Buffalo Car Service Association is just getting to work and illustrates these and other points in the same way that has been observable at other places. Complaints made at a meeting of the Merchants' Exchange brought out the usual evidence of delays in switching, in sending notices of arrival and of petty carelessness generally. The fact that Boston consignees get 96 hours' free storage has not escaped the Buffalonians, which shows the value of uniform rates. Railroad officers have better facilities than any other class for consultation with each other throughout the whole country, and, therefore, have less excuse for inconsistency as between distant points than would be the case in business generally. But probably the Buffalo roads will plead that it would be an impossible feat to get the cold and conceited Bostonians to make any concession. One of the plainest lessons from the demurrage agitation is the need of complete telephonic service or other means of promptly notifying consignees when their cars have arrived. It will be recalled that the Southern Railway & Steamship Association, in formulating its demurrage rules, recognized this point, demanding a lien on goods for demurrage only when notice of arrival had been given. This is an innovation on ancient traditions, but it is a reasonable one, and one that must prevail. To insist that notices are given "by courtesy, and not of right," is inconsistent with modern business methods, and the delays resulting from unsystematic notification or no notice at all are an economic loss for which there is no recompense. The railroads can well afford to meet the merchants half way in stopping this loss. Moreover, it is a very small town that cannot afford to give notices by the very best means, the wire. Messenger service is in most cases a clumsy arrangement, and postal cards are slow but not sure. Sending notices before the actual arrival of goods will always produce friction, and every hour of delay after the car is ready to be unloaded is a loss which in the long run is vastly more expensive than giving positive notification, getting an acknowledgment and making a record of it, however expensive telephone rent or messengers' wages may seem in individual cases. Another advantage of telephones over messengers is the greater freedom of intercourse afforded.

To be well acquainted with one's customers is an advantage to a railroad agent as well as to a grocer, although the fact has not been very widely recognized. It is well to remember, however, that, to realize this advantage, the freight clerk who tends the telephone should be as well skilled in suavity as the car-service commissioner himself.

Enforced Equality Between Different Articles.

In its decisions as to rates the Interstate Commerce Commission has usually accepted the theory of charging what the traffic will bear. But it has applied it to protect the shippers rather than the railroads. It is a poor rule that will not work both ways, so the Commission thinks, and so the railroads are beginning to find out to their cost.

A recent decision on corn rates from Indianapolis carries the principle much further than ever before in restricting the powers of the railroads. Rates on hominy had been the same as those on corn. The Pennsylvania, among other roads, had reduced corn rates to meet water competition without making a corresponding reduction on hominy. The Commission holds that this is unlawful, and constitutes discrimination within the meaning of the third section of the Act to Regulate Commerce. This is somewhat surprising. When the act was passed hardly any one would have applied this section so broadly. It was considered somewhat of a stretch of its intent when the Commission, in the case of *Boards of Trade Union of Farmington et al.*, used it to prohibit discrimination between different localities. It is a much greater stretch to apply it to distinct articles of commerce, as is done in the present instance.

The Commission undoubtedly reasoned as follows: If a man builds a mill at Indianapolis when the rates on corn and on hominy are equal, he is able to ship his products to the seaboard. His freight on the finished product is offset by his saving of freight on the raw material. This is unquestionably a powerful motive in leading him to locate where he does. If a subsequent change in the rates on corn gives an advantage to the mills near the seaboard, the competition becomes unequal. The men at Indianapolis can no longer compete, unless they receive a corresponding reduction on their finished product. In other words, the traffic will not bear a difference in rate between raw material and product.

This reasoning does not affect the whole business of the Indianapolis mills. It does not apply to their local trade. It only applies to the hominy which is consumed near the seaboard. Have they a natural right to such traffic simply because they were once able to carry it on? We confess that we have some doubts whether the courts would sustain the Commission in this view of the matter. The case is different from that of the Farmington wheat shippers. The whole business of Farmington was adversely affected by the difference in rates. Only a small part of the Indianapolis shippers' business can be thus affected. If the lakes are taking traffic away from the railroads under the present grain rates, New York becomes a relatively better place to buy corn, and Indianapolis a relatively worse one, than would be the case under the direct operation of the railroad tariffs. Why should the railroads suffer the whole loss, and be compelled wholly to protect the mills from the adverse consequences of the change?

In another light, the principle laid down is yet more grave in its probable consequences. It is impossible to tell where it may stop. No change in classification can be made without affecting old conditions of business competition. The very fact that the burdens of some men are lightened usually deprives others of advantages which they have hitherto enjoyed. Are such advantages to be treated as vested rights, merely because they have once existed? If so, the Interstate Law itself was one of the most monstrous pieces of injustice ever passed. It did away with a whole system of conditions which had grown up, and to which business had become accustomed; it substituted another and very different set of relations, involving readjustments compared with which that of the Indianapolis hominy mill is a mere bagatelle. "Why beholdest thou the mote that is in thy brother's eye, and seest not the beam which is in thine own eye?"

But, while we think that the Commission deals with the case in a one-sided and rather questionable way we do not believe that the results will be wholly bad. A decision like this will tend to make the railroads feel more heavily their responsibilities in the matter of classification. At present most of our classifications bear the impress of the haphazard manner in which they have grown up. In some regions and in some

lines of business they have been more or less systematized, especially in recent years; but in other parts we have a jumble nearly as bad as a United States Tariff act. Anything which makes the higher railroad authorities feel a responsibility about getting this matter on a permanent and systematic basis cannot fail to be an advantage. We hope that such will be the outcome of the present decision, and of the controversies to which it must inevitably give rise.

Compound Locomotive Tests—Michigan Central Railroad.

The Schenectady Locomotive Works, assisted by the Michigan Central Railroad, have in contemplation a series of tests which will conclusively show the action of the new compound engine. One of the best draughtsmen from the Schenectady Works is in charge of the tests. As he has had experience in running both marine and locomotive engines, and has also had a technical education, it may be expected that the results will be so well recorded that the conclusions drawn cannot be questioned. In an editorial in the *Railroad Gazette* Sept. 27, 1889, we called attention to the delicacy with which locomotive tests should be handled, and the necessity for such complete and accurate data that apologies need not be made for the lack of positive statements in the conclusions drawn from such tests.

In looking over the apparatus to be used in the case at hand, one will find a very satisfactory indicator rig, except it be for the long pipes reaching from the cylinder heads to the indicators. The valve used to connect the steam pipes and indicators is of novel and original design. It has four ports, and by it the indicator is connected to either end of the steam cylinder, with the atmosphere and with the steam chest. By this means not only the cylinder pressure and the atmospheric line, but also the receiver pressure, which is the same as the steam chest pressure, is recorded on the indicator card. In the cab are a revolution counter, which gives the speed, and a vacuum gauge connected with the smoke-box which shows the draft used to keep the fires burning.

If ever there was a time when we needed accurate locomotive tests it is now while the compound locomotive is being experimented with. The old methods of making locomotive tests which result in only general indications, and give no tangible, positive and accurately comparable results should be avoided. The additional cost of satisfactory engine tests is not so great, nor need they be so complicated, as to prohibit them in cases of this sort where the accuracy must be unquestioned, owing to the importance of the subject and the wide interest taken in the possible extended use of the compound locomotive in the United States.

This suggests a fact relative to compound locomotives to which our attention has been again called, this time by Mr. H. H. Westinghouse, who has probably experimented more, with compound stationary engines, of sizes differing but little from locomotive dimensions, than any other manufacturer in this country, and as much as any other in the world, unless it be the Willans Engine Co., of England, which has made a specialty of triple expansion stationary engines. The Westinghouse engine experiments show conclusively that with a plain, non-condensing, compound engine it matters but little, so far as economy is concerned, whether the cut-off in the high-pressure cylinder be at three-fourths or one-half stroke, and that a decrease of the cut-off below half stroke rather decreases than increases the economy; and further, that below one-half stroke a throttling governor is quite as economical as an automatic cut-off, so far as the high-pressure cylinder is concerned. Some tests made a few years since at the Massachusetts Institute of Technology showed that at early cut-offs it was quite as economical to throttle the steam as to use the automatic cut-off, and that at very early cut-offs the throttling plan was the more economical. Experiments with the Woolf type of locomotive in France, as stated in the *Railroad Gazette* March 8, 1889, showed that there were conditions in the operation of locomotive engines where wire drawing of the steam by partial closing of the throttle was more economical than a regulation by means of the reverse lever. Besides these evidences, there are others to be drawn from the Willans engine tests by Prof. A. B. W. Kennedy of London, and from the personal experience of many who have watched in a general way the operation of locomotives. The connection between this and the preceding lies in the well-known admirable effects in reducing the amount of water present in vapor passing out of a boiler, brought about by a wire drawing of the steam. It is to this effect that the

greater economy which has resulted in some cases with the throttling governor and a partially closed throttle has been largely attributed.

The point of all this is one of great importance to designers of compound locomotives, for the reason that with the simplest forms of valve gear for such locomotives all attempts to cut off in the high-pressure cylinder at less than half stroke, have so far, resulted in an excessive compression and other undesirable effects; and if it be of no advantage to regulate with the reverse lever when the power required is below that given when the cut-off in the high-pressure cylinder is less than half stroke, then the Stephenson link motion has a new lease of life, and may be acceptable with the compound engine, and one of the difficulties in the design of a compound engine having the same number of parts and operating with the same simple functions as a simple engine, with which all are so well acquainted, has been removed; and further, the excessive inside clearance in the high-pressure steam valve which now seems almost a necessity need be no longer used, and the ordinary valve gear be retained, except for the increased dimensions of the ports and passages leading to the cylinders.

Some Points of Discipline.

The officers of the Pennsylvania lines are determined there shall not be a repetition of the collision at Kokomo, which occurred through the failure of the trainmen to examine the register. One of the division superintendents last week suspended for 30 days the engineer and conductor of a train, and the telegraph operator and agent at a station, for allowing an engineer to leave the station without examining the register and signing his name.—*Exchange*.

This is, in one sense, a fine of \$350 for a failure to do a very little thing, and one which had no doubt gone undone many times before; and at first sight the penalty may seem very severe. The conductor had probably seen that everything was all right; why should the engineman be compelled to go to the telegraph office, detaining the train several minutes, simply to carry out a red tape requirement, a mere formality? This view is entertained—is secretly cherished, if not boldly defended—by many intelligent train and station men. And many otherwise intelligent persons in these classes act on the basis of such a theory, whatever ideas about it they may have formulated. We have not set up this statement merely for the purpose of knocking it over.

Is this really an unjust punishment? From the tenor of remarks made to the writer a few days ago by an old superintendent on another road, it may be imagined that the admonition to the several men was, or should have been, somewhat as follows:

To the engineer: Are you willing to trust your reputation as a careful engineer to the unaided memory of a conductor, however faithful he may be? Are you fulfilling your obligation to the company when you move out upon the road with a train valued at many thousand dollars without knowing, of your own knowledge, that you have the absolute right of track to the next station? If you think that these duties can be performed by depending wholly upon memory, go a step further: are you willing to trust your own life to anything less certain than a black and white record, seen by yourself? If even your own life is not a moving consideration, does not your duty to your fireman, your feeling for the numerous poor widows of firemen and other trainmen that you have known impel you to take every precaution that you can possibly think of to avoid a collision? You, with others, have much to say about the brotherly feeling among railroad men, their "loyalty" to each other, and so on; but what could be more heartless or disloyal than to risk a brother engineer's life? Does not a little thought on these things put to shame any suggestion about not having time to perform duties required to insure safety or about "having to do the conductor's work?"

To the conductor: Do you have a general contempt for "red tape" and constantly act on the feeling that your first duty is to make time; to always get away from a station promptly, even if you do have to "take chances" once in a while? Is it a reflection on your capability and your fitness for your place for the engineer to keep a watch upon you to see that you make no mistake? If he neglects his duty in that respect, is it slightly galling to your pride to remind him of his neglect? Or, assuming that you have not failed to admonish the engineer when admonition was necessary, has he received your kind offices in a resentful manner? If he has done this—or, what is worse, practically refused to comply with the rule—has a false feeling of friendship for him or of cowardice concerning possible disclosure of your own shortcomings deterred you from reporting the facts to the superintendent? What weight have considerations of this sort when human life is at stake?

To the operator: Are you too young and inexperienced to tell old engineers and conductors their duties? Is an operator justified in disobeying a plain rule which tells him to do everything in his power to secure the safety of trains, simply because it requires considerable courage to face a burly engineer and "tell him his business"? Have you had difficulty in getting signatures to orders or in getting trainmen to read them carefully to you? If so, have you reported every case to the superintendent? Do you see the interests of the company suffer, and possibly the safety of trains and passengers be imperilled, by jealousies between conductors and engineers? If so, which would be the more friendly act, for you to remain a silent observer or to let the fact be known at headquarters?

To the station agent: Where were you when this dereliction took place? Do you let young operators work wholly without supervision as soon as they have a passable knowledge of their duties, or do you always calculate your own work, when possible, so that you can oversee the important transactions in the telegraph office, even when the theory of your duties does not specifically require your presence there? If you were a conductor or an engineer would you not be glad to be watched by a critical eye when performing duties on which life and death hinge? "Put yourself in his place."

The list might be greatly extended, of course. We will assume that all or most of these questions were asked in the presence of all four of the employees named. The superintendent may well illuminate his position by pressing home the fact that he makes rules for the men no more severe than he would himself wish to work under.

The *Railroad Gazette* has many times warned managers that the rules in which they embody their general instructions to their men are in numerous important features very faulty; that if men fail to render obedience the authority issuing the rules cannot wholly wash its hands of responsibility in case of disaster. This is strikingly true on many roads, and not unimportant ones, and the fact has its influence on nearly all roads; but the rule requiring conductors and engineers to examine train registers is not one of those criticized. We do not recollect ever having seen an ambiguous paragraph on this subject, the worst fault we recall being the placing of all the registering stations of a large road in one paragraph, instead of in proper order by divisions and near the time schedules. The report taken for our text may, therefore, well be suggestive to train men. We know nothing of the details of the case or of the peculiar excuses that may have been offered; in fact we are not lecturing these particular men. The lesson is a general one, and the fault is of a nature which all need to guard against. The only suggestion we have to offer superintendents is, that they do not wait for a Kokomo collision on their own roads before finding out how near home a dangerous laxity of discipline may be prevalent. Of course, the suppositious questions we have cited take for granted a pretty well regulated superintendent's office. If you have not the face to ask such questions of your men, what is the reason?

The Government and the Telegraph.

Two sets of telegraph projects are now before Congress, one for government control and the other for government ownership. The former is embodied in a bill modeled on the Interstate Commerce Act. It follows its model so closely that many sections are almost the same word for word. A similar bill was introduced into the last Congress, but failed to pass.

We can only repeat in brief the tenor of the comments which we made at that time. We do not believe that any such transplanted railroad legislation will do much good. The evils in telegraph management are different from those of railroad management. No well-informed man complains of American railroad charges as being generally too high. The trouble consists of differences in charge, and the evil is to be met, if met at all, by laws prohibiting discrimination. In telegraph business, on the other hand, people care more about the absolute rate than about the differences in charge. A law against discrimination would not touch the general schedule of rates. It would leave the Western Union people free to

"Compound for sins they are inclined to
By damning those they have no mind to."

It might prevent a few abuses; but the aggregate result would hardly be worth the trouble which it would involve. If, as in the bill now before the Senate, the administration of the law were left to the Interstate Commerce Commission, it would add new work to a body already loaded with more business than it can attend to. Nor would the Interstate Com-

merce Commission have the technical knowledge of telegraph management necessary for dealing intelligently with problems of this kind. It is successful with railroads because it understands railroads; it is in the nature of things impossible that it should obtain the same degree of special knowledge of telegraphs also. This difficulty might be obviated by the creation of another commission for telegraphs; but it is questionable whether the results would be worth the expense.

Mr. Wanamaker's project is much more ambitious. He would have the government make contracts for the construction of telegraph wires between the more important post offices, and let it take up a postal telegraph business between these places as an incident of its work. He thinks that this could be done with but slight additional expense, because it would be pretty much confined to those places which have already a free delivery service, and which are thus well equipped for handling dispatches. He would avoid most of the waste which would be involved in duplicating the Western Union system, because he would build but few lines; he would avoid altogether the loss which the government would suffer if it bought up existing lines at inflated prices.

These are the advantages of the plan, as set forth by the Postmaster-General. It has several disadvantages, to which he hardly seems to have given due weight. A government telegraph which should connect cities and not serve the country would become a powerful means of discrimination. The cheaper it did its work the greater would this discrimination be. Places of moderate size would be anxious to become government telegraph stations, so as to have the discrimination in their favor instead of against them. It would be for the Postmaster-General and his subordinates to determine what places should be telegraph stations. This discretionary power would give an opportunity for political favoritism. A business discrimination is bad but a discrimination based on other than business grounds is vastly worse.

However good the intentions of the authorities might be, they would have to have great technical knowledge to be safely trusted with a power of this kind. It would be extremely difficult for the Postmaster-General to acquire such knowledge. Mr. Wanamaker is certainly far from possessing it. It is true that he did not deem it practicable at the present time to establish a rate for messages uniform over the whole country; but he thought that "it might be done at some future time, and he was very much impressed with such an idea." The relation between distance and expense of transmission is a difficult one to settle, but it is not to be lightly waived aside in this way. Uniform message rates, independent of distance, can be established in a comparatively small country like England; but if they were applied throughout the United States one of two things would happen. Either the long-distance business would be done at a great loss, or the short distance telegrams would be heavily and unnecessarily taxed. If a man fails to see this dilemma it shows a serious lack of technical training, and makes it undesirable to give him too much power.

The trouble is that such a lack of training is hardly avoidable under our political system. During General Grant's administration, Postmaster-General Cresswell made proposals for government telegraph ownership much more sweeping than those of Mr. Wanamaker. The matter was made the subject of an official investigation, in which Mr. Orton, of the Western Union, proved much more than a match for Mr. Cresswell. A foreign critic, favorable to government management, admitted the defeat of Mr. Cresswell in the argument, but claimed that it was hardly fair, because the head of a private corporation would naturally know much more about the subject than a postmaster-general. But if a postmaster-general cannot know enough to argue well on the necessity of a government telegraph, how can we expect him to know enough to manage it well. The second is harder than the first, and the danger from mistakes vastly greater.

"No Picnics Allowed."

The new management of the Santa Fe is not disposed to give its district and traveling passenger agents much recreation. The applications of several of them to go to Jacksonville, Fla., were refused, the General Manager stating that the business of the system needed the best and continuous efforts of every man in the service.—*Exchange.*

Probably this is in the nature of a joke. There is some entertainment to be found in a trip to Florida at this season, and a passenger agent who has never been there may quite likely regard it as partly a "picnic;" but the application was doubtless made by the agents and considered by the Manager in a strictly business sense. The duties of a traveling passenger agent consist largely in

visiting local ticket agents and practicing those coquetish arts which tend to entwine the local agent's heartstrings around the personality of the traveling agent, and incidentally (?) around the road which sends him. There was a convention of local agents at Jacksonville, and there was doubtless reason in the claim that more friendships could be captured at a given expense by going there than by visiting each agent at his home. The possible conquests at such a gathering are numerous and important, but as every one knows the actual success is often in small ratio to the possibilities. The men seen and influenced are few as compared with those who escape. There is therefore a legitimate question whether the extra expense and the neglect of regular business will be warranted in a given case. On this point the General Manager probably chooses to use his own judgment, and the subordinates must of course submit.

We have mentioned before the policy recently adopted by the Safety Car Heating & Lighting Co., controlling the Pintsch system of lighting, in establishing its own works for the manufacture of gas. The company now has works running in Chicago and at Mott Haven, N. Y., and is completing others in Boston and St. Louis. Apparatus is being prepared for work in six other cities, including Cincinnati and Buffalo. From the Chicago works, gas is supplied to the Lake Shore, the Monon, the Wabash and other lines. The company expects to make the business of supplying gas commercially profitable and at the same time facilitate the extension of its system of lighting to roads and lines not prepared to put in works. It is contemplated to develop the business of lighting street cars, and cars on a cable road in New York are now running, lighted by the Pintsch system. The company is also working up a system of heating street cars by gas, using indirect radiation. Pintsch lights have been applied to a good many Pullman cars, and are being put on the Wagner cars wherever it is possible to supply the gas. Pullman and Wagner cars are now running from New York to Chicago and St. Louis lighted with from 10 to 15 four-flame centre lamps each, affording the most beautiful illumination. These cars make the round trip with one charging of gas. Among the roads which are now using this system are the New York Central, the Boston & Albany, the Old Colony, the New York & New England, the New York, Providence & Boston, the Louisville, New Albany & Chicago, the Cincinnati, Hamilton & Dayton, the Wabash, the Erie, the Chicago & Atlantic, the West Shore and the Rio Grande Western. The Central of New Jersey has recently adopted the system and will erect works at once. With the increase of works for the manufacture and supply of gas there will shortly be no reason for continuing to light Pullman and Wagner sleeping cars with oil lamps. Hereafter, of course, it has been impracticable for those cars to depend upon gas lighting in running over roads which do not use the system; but the establishment of independent works by the Safety Co. in numerous cities will solve this difficulty, and presumably it will not be long before Pullman and Wagner cars are as brightly lighted as some of the best day coaches now are, which, strange as it seems is not now the case.

The Buffalo *Courier* has invited the opinions of 50 general passenger agents on the proposition of the Interstate Commerce Commission to prohibit payment of commissions on tickets and to repress ticket brokers. A discouragingly small number sent answers. Mr. Hancock of the Philadelphia & Reading, commends the Pennsylvania law which forbids the sale of tickets except by authorized agents. Mr. Taylor, of the Richmond & Danville, summarizes the whole question in a letter which just hits the nail on the head. Mr. Busenbark, of the Chicago, St. Paul & Kansas City, believes in the payment of a fair commission to regular agents of connecting roads, say 10 per cent. He thinks two-thirds of the traveling public allow themselves to remain very ignorant of railroad geography and therefore need advice in choosing a good route from among poorer ones. If the agent has no commission he will not take pains to inform these ignorant passengers (beyond his own road), whereas if he has a slight incentive he will do a great deal of good work that otherwise would not be done at all. Mr. Busenbark apparently regards such an expenditure as good business economy, especially for lines in undeveloped territory, even if all competing lines pay commissions. How to prevent rivals from constantly attempting to slightly increase the rate of commission without informing their competitors is a problem which Mr. Busenbark does not discuss.

Corn is a troublesome article just at present. The Indiana roads are reproved for reducing rates; the Nebraska roads are raising a storm of popular indignation by not reducing them enough. The latest news from the latter state is of a pretty serious character. Representatives of the shippers ann of the railroads agreed upon a 10 per cent. reduction. The people are far from satisfied. They intend to kill the members of the board politically, and to disavow the compromise. It has become a political crime to see that there are two sides to the matter. Yet, when we come to the bottom facts, the situations of the railroads and of the farmers are very much alike. There has been unwise duplication of Western railroads; there has also been unwise duplica-

tion of Western corn farms. The increased supply of corn thrown upon the market has so reduced the price that there is barely enough money in the business to pay operating expenses, and nowhere near enough to meet the fixed charges which have been incurred. Both farmers and railroads find it hard to pay interest on their mortgages. Each party naturally strives to shift the burden as much as possible onto the shoulders of the other. It is not an easy matter to settle; it cannot be settled at all except by compromise. When one party disavows the action of its own committees, punishes intelligence as a political crime, and demands that action be taken under the influence of feeling rather than reason, the case becomes very serious indeed.

As car-coupler tests will form one of the duties of the mechanical department of railroads, it may be worth while for the manufacturers of testing machines to prepare their machines so as to be suitable for that purpose. In some of the machines now constructed it is impossible to put a Master Car Builders' vertical plane coupler in position for testing without planing off both sides of the stem. As this materially weakens the stem—in some cases has weakened the coupler so that it is impossible to test it—it would be better if the machines intended for use on railroads could be adapted to take in draw-bars.

An important change in organization on the New York Central & Hudson River is announced. An operating department is created with the new offices of Third Vice-President and General Manager. Mr. H. W. Webb, now Vice-President of the Wagner Palace Car Co., becomes third Vice-President of the New York Central & Hudson River, and Mr. J. M. Toucey, for many years General Superintendent, is made General Manager. Mr. Theodore Voorhees is promoted to be General Superintendent.

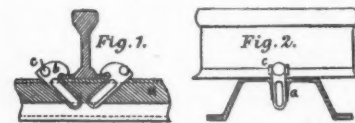
The sub-committee having in charge the experiments with brake shoes going on at Aurora have made several preliminary tests, and have arrived at results which indicate that the tests which they are contemplating will prove satisfactory. Soon drawings will be published showing the shape of the small 4 in. x 1 in. shoes which the different brake shoe companies will be asked to furnish as samples of their manufacture.

TECHNICAL.

Some Recent English Patents.

G. T. Hyde, London. Improvements in Swaging Metallic Shapes by Means of Rolls, June 13, 1888.—This invention has for object the cheap and expeditious production of metallic articles of different cross-section at different parts of their length, and of greater length than the circumference of rolls of practical diameters. The improvements consist in arranging the opposing dies or cavities in the rolls in a helical direction, so that the articles, as they are passed between the rolls and are swaged, move in the direction of the length of the roll. In the rolls are grooves conforming to the shape of the articles to be made, and excavated in a helical direction. The helix in the upper roll is in the direction of a left-handed screw thread and the helical groove in the lower roll is in the direction of a right-handed screw thread, the helical grooves in the top and bottom rolls being of equal pitch, so that throughout the rotation of both rolls at equal velocities the grooves shall coincide at their margins at the line of contact. The bar to be shaped is presented to the rolls in a tangential direction to the helical grooves near the right end of the rolls, and entering the grooves is swaged by the rolls into the combined form of the cavities, moving during the operation toward the left end of the rolls, whence it is discharged in the finished shape. The shape of the cavities in the rolls may produce a bar or rail having flished ends for uniting it to other similar bars or rails.

11,023. J. Lambert, Roussillon, France. Improvements relating to Railway Sleepers and to Means for Securing the Rails thereon. July 30, 1888.—This invention relates to transverse and longitudinal metallic sleepers. A strong rib *a* is formed by rolling on the underside of a sleeper of inverted U section as shown, or of other suitable section. This rib *a* is pierced with two cylindrical holes at a suitable distance apart, and converging at their lower ends. The rails are secured upon the sleepers by means of two cylindrical clamping bolts or pins *b*, flattened at different parts round their circumference so



as only to leave sufficient surface for the necessary friction to press and hold the foot of the rail against the sleeper. The bolt is formed with two small cylindrical projections *c* for a crowbar to operate against. When the bolt has been drawn out to a slight extent with the crowbar, it can be turned round with the crowbar until it clears the foot of the rail, and the latter can then be removed without entirely drawing the bolt. The clamping operation is effected by a few blows of the hammer.

Boyden vs. Westinghouse.

The Boyden Brake Co., of Baltimore, on Feb. 10, filed three suits, against the Westinghouse Co., the Northern Central and the Western Maryland railroads, for infringement of its triple valve patents of date June 26, 1883 (reissued April 2, 1889). These are counter-suits, following the previously announced application by the Westinghouse Co. for an injunction.

Railroading South of Panama.

Virginia papers state that Col. H. C. Parsons, of Natural Bridge, Va., will go to South America in March, to superintend the surveying of his proposed railroad, and will be accompanied by 300 men armed with Winchester rifles and a Gatling gun. This precaution is taken because the country to be surveyed is inhabited by savages who have successfully resisted Spanish invasion.

Burton Stock Car Co.

The annual meeting was held in Boston recently. The report for the 11 months to Dec. 31 showed gross earnings of \$99,381; total expenses of \$83,916; net earnings of \$15,465; preferred dividends, \$6,055; surplus, \$9,410; surplus Jan. 1, 1889, \$3,729; total surplus, \$13,139. This surplus equals about 2½ per cent. on the \$540,000 outstanding common stock. The company has leased to the New England Car Co. 500 stock cars for four years from Dec. 23, 1889, for a fixed rental and a mileage allowance. These are all the available cars the company has, except 170 cars used in the transportation of horses. It is delivering to the company about 20 cars per day, and has already turned over, relettered to suit the lessees, some 250 cars, which are to be hauled to Texas to be loaded with live cattle. The company proposes to ship fat hives from points beyond Kansas City to Boston market, to be slaughtered there. Besides this contract the Burton Co. has licensed a large western railroad to build 1,000 cars on the Burton pattern for a royalty. Over 100 of the Burton horse cars have been built at the shops at Wichita, Kan., the past year. Ten are now being constructed for the Adams Express Co., as already noted, and they will be operated in passenger train service on the Pennsylvania lines between New York and Chicago. When not used for horses the stall partitions will be moved to one side of the car, making the car available for return loads of merchandise carried by the express company. The stockholders elected the following directors at the meeting: President, Joseph C. Moore; Vice-President, Charles A. Sinclair; Treasurer, Charles Howard; Clerk, Clarence Hale; Directors, J. C. Moore, Ezra H. Winchester, Frank Jones, J. O. Davidson, Charles A. Sinclair, James F. Cook, Edward Spalding, Virgil C. Gilman, Charles F. Adams, George D. Burton, W. S. Reed, M. V. Livingston, Charles Howard.

A Double Deck Ferryboat for the Pennsylvania.

Messrs. Hoffmire & Co., of New York, have the contract from the Pennsylvania Railroad, to rebuild the ferryboat New Brunswick, which was last summer burned to the water's edge in the Hudson River. The boat is now rebuilding at the foot of Seventh Street, East River, New York. This will be the first double-deck ferryboat on the North River, and is designed to enable passengers to land from the upper deck on the level of the bridge which the company will build across West street. It is expected that she will be ready for service May 1. She will be 206 ft. long over all and 60 ft. wide.

The interior will be painted white with enamel paint. The cabins will be elaborately paneled, and around the window frames papier maché decorations will be used in colors and gilded. The upper deck will be enclosed and will seat upward of 600 persons. Seats will also be provided outside the upper deck-house. The cabins will have elliptic head ceilings, paralleled. Surmounting the upper deck there will be an arched roof 116 ft. long by 34 ft. wide, having glass sides to permit light and ventilation to reach the lower cabins. Four stairways, one in each cabin, will be provided for access to the upper deck fore and aft. Folding gates will be used on both decks. The boat will be lighted by electricity.

R. H. Theall, of New York, has the contract for the engine and machinery, Hoffmire & Co. are the designers of the boat, while Bruce Price, of Twenty-third street and Sixth avenue, has designed the decorations.

The Manchester Ship Canal.

Work on this great enterprise, which is contracted to be finished at the end of next year, is in such a forward condition that the contractors hope to have it completed before the expiration of the contract time. Two hundred miles of temporary track are laid and 166 locomotives are employed. For some time to come work will be prosecuted day and night, a large stock of Lucigen lights having been purchased to light the workings. The docks at Salford, which are large enough to accommodate the largest Atlantic liner, are nearly completed. They, with the docks on the Manchester side of the canal, afford five miles of quay space. The promoters are now making arrangements to secure the traffic they hope for on the completion of the canal, and the first of a series of excursions, which are to be extended through the year, by business men of Liverpool and Manchester and ship owners, accompanied by canal officials, has just taken place, the intention being to induce them to secure locations for freighting and manufacturing enterprises.

A Tunnel under the Harlem River.

A bill has been introduced into the New York Assembly providing for a tunnel under the Harlem River. The proposition is that the President of the Board of Fire Commissioners, the Commissioner of Public Works and the presiding Justices of the Supreme and Superior Courts of the city shall appoint a commission of three to construct the tunnel and determine grade lines. The tunnel is to be 60 ft. wide and of such depth as to permit a channel above it of 22 ft. at mean low water. The project is opposed by a good many existing interests, and it seems very doubtful if the bill goes through.

Moore & Co's Shipyard.

The Naval Board appointed to inspect the ship yard of Moore & Co., Elizabethport, N. J., for the purpose of determining its capacity for the construction of war vessels, has reported to the Secretary of the Navy. The report says that the plant now on hand, with certain additional tools and machinery, which could be easily obtained within three months' time, is sufficient for the construction of naval vessels of the smaller class, such as the two 1,000-ton gunboats and the 800-ton practice ships, for the construction of which this firm has made a bid.

The Forth Bridge.

On Jan. 24 the first passenger train passed over the Forth Bridge. The train left Edinburgh shortly before ten o'clock in the forenoon, and proceeded by the New Corthorpe & Dalmeny line to the Forth Bridge Station at South Queensferry. The following traveled by the train: Lord Colville, of Culross, Chairman of the Great Northern Railway Co.; the Marquis of Tweeddale, Chairman of the North British Railway Co. and the Marquess of Tweeddale; Mr. Matthew P. Thomson, Chairman of the Midland Railway Co. and of the Forth Bridge Railway Co.; Mr. Wieland, Secretary of the North British Railway Co.; Mr. Holmes, Locomotive Superintendent, and Mr. William Arrol. On the arrival of the train at the Forth Bridge Station it was joined by Sir John Fowler, Mr. B. Baker and others. The train passed on to the south approach viaduct at 10:20, and at 10:25 reached the south end of the South Queensferry cantilever. At 10:29 the train passed on to the north approach viaduct, thus occupying four minutes in crossing the bridge proper. The details of the arrangements for the official opening of the bridge by the Prince of Wales on March 4 next are not yet definitely settled, but it is understood that they will be somewhat as follows: The Prince of Wales, the Duke of Edinburgh and Prince George of Wales will arrive at Waverly Station, Edinburgh, on Monday, March 3. The royal party will stay at the New Club, and on the evening of the 3d the directors of the Forth Bridge Railway Company and the engineers of the bridge will dine with the Princes at the club. The royal train will leave Edinburgh in time to reach the bridge about 11 o'clock in the forenoon of the 4th. After the train has crossed the bridge it will go over the new approach railway to Inverkeithing, from which it will return to the bridge. At the connecting girder on the north side the ceremony of driving the last rivet of the bridge will be performed by the Prince of Wales. At Inch Garvie the party will alight, and, should the weather be favorable, embark on board a steamer for the purpose of viewing the bridge from the Firth. The party will again join the train at Inch Garvie, and on regaining the approach viaduct at South Queensferry the Prince will declare the bridge open. After the ceremonial a banquet will take place at the works.—*Industries.*

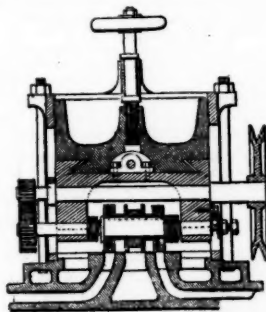
Machine for Milling Valve Ports.

A patent has been granted to J. Davis, of Altoona, Pa. for a machine for milling the valve ports of locomotive engines.

Claim.—(1) In a machine for finishing valve face ports, the combination of a supporting frame, two carriages fitted to traverse at right angles one to the other therein, a cutter shaft journaled in one of said carriages, and a series of milling cutters fixed upon said shaft, substantially as set forth.

(2) In a machine for finishing valve face ports, the combination of a supporting frame, two carriages fitted to traverse at right angles one to the other therein, a cutter shaft journaled in one of said carriages, and a series of alternately located milling cutters and adjusting blocks fixed upon said shaft, substantially as set forth.

(3) In a machine for finishing valve face ports, the combination of a supporting frame, a series of lateral clamping bolts fitting therein and adapted to engage steam chest bolt holes, and upper carriage fitted to slide vertically in guides in the frame, a downward feed screw journaled and held against longitudinal movement in a bearing in the frame and engaging a nut on said carriage, a lower carriage fitted to slide horizontally in guides on the upper carriage, a longitudinal feed screw journaled and held against longitudinal movement in a bearing in the upper carriage and engaging a nut on the lower carriage, a cutter shaft journaled in bearings on the lower carriage transversely to the longitudinal feed screw, and a series of milling cutters fixed upon said shaft, substantially as set forth.



(4) In a machine for finishing valve face ports, the combination of a supporting frame adapted to be temporarily fixed upon an engine cylinder, an upper and a lower carriage fitted to traverse at right angles, one to the other, in said frame, feed screws actuating said carriages, a cutter shaft journaled in the lower carriage, a series of milling cutters fixed upon said shaft, a shaft carrying a driving pulley and journaled in the lower carriage, and gearing connecting said shaft with the cutter shaft, substantially as set forth.

Getting Rid of Four-Wheel Cars.

The Philadelphia & Reading announces that hereafter four-wheeled coal cars will be run only between the mines and Port Richmond wharves; also, that all such coal cars must be run in the rear of all trains. A great many wrecks have been traceable to these small cars, and this movement is intended to prevent their frequent occurrence. It will be remembered that the road has recently destroyed a large number of this class of cars.

Pennsylvania Improvements in Jersey City.

The Pennsylvania is erecting on the site of old Mount Pleasant Park, in Jersey City, a roundhouse which will be 323 ft. in diameter, and will accommodate 45 engines. The roundhouse will be the centre building of large shops to be built at this point in connection with other improvements to be made at Jersey City.

Electric Motors.

Gradually the electric motor is being enlarged, and it is rapidly approaching a size that gives it a capacity not much below our average switching steam locomotive. One of the latest moves in the direction of a higher capacity electric motor is that of the Thomson-Houston Co., who are now building some electric locomotives for the West End Street Railway Co., of Boston, capable of drawing a long train of cars; that is, there will be a powerful motor car drawing a number of cars, as common with cable systems of street railroads.

An Improvement in Foundry Work.

In the foundry department of the new works of the Westinghouse Air-Brake Co., at Wilmerding, 12 miles east of Pittsburgh, a new process in molding will be put in operation, which is to be found at no other establishment in the country, and at not more than one or two others in the world.

On each side of the cupolas, running the entire length of the foundry building, is a set of continuous tracks, with a turn-table at each end. Trucks attached to a continuous chain run on these tracks, carrying the molds past the cupolas, where the molten metal is poured in, and then back to the cleaning-room. In the cleaning room the casting is removed. The empty box keeps on going until it comes to its starting-place, where it is replaced by a new one. On each track 156 trucks will be run, and each one will make a round in about five minutes. As there are two sets of trucks, one on each side of the cupolas, it will be possible to make 312 casting every five minutes, or 3,744 an hour. The speed of the trucks is regulated only by the length

of time required for the castings to cool sufficiently to be removed.

The right to build and use the continuous-molding process in America was purchased some time ago by the Westinghouse Company from the firm of Alley & MacClellan, of Glasgow. A small plant, operated by hand, has been in use at the works of the company in Allegheny City for some time, and has proved very successful.

The Hudson Suspension Bridge.

The work of changing the tracks of the West Shore at Fort Clinton to make room for the westerly tower of the Hudson Suspension Bridge at the water-front is nearly finished, and the bridge company expects that the ground will soon be cleared to permit the beginning of work upon the tower foundation. The company is investigating the use of electricity with a view of hastening the operations at Bull Hill tunnel, through which is to run the railroad from the western end of the bridge to Turner's station on the Erie.

Circulars to the Master Mechanics' Association.**RELATIVE VALUE OF STEEL AND IRON AXLES.**

Your Committee on "Relative Value of Steel and Iron Axles" respectfully submit the following questions:

1st. What, in your opinion, would be the safe limit of diameter for driving axles?

	Weight per journal.
Steel.....	12,000
.....	16,000
.....	20,000
.....	12,000
.....	16,000
.....	20,000

For engine truck axles?

	Weight per journal.
Steel.....	5,000
.....	8,000
.....	11,000
.....	5,000
.....	8,000
.....	11,000

For tender and car axles?

	Capacity.
Steel.....	40,000
.....	50,000
.....	60,000
.....	40,000
.....	50,000
.....	60,000

2d. Please give the relative wear of steel and iron axle journals per 50,000 miles run?

3d. Please give the relative wear of journal bearings on steel and iron axles per 50,000 miles?

4th. Have you had any steel axles break under locomotives or cars? If so, were they crucible, open hearth or Bessemer? Please give mileage to time of fracture?

5th. In your practice do you find steel driving axles to run any longer without turning than iron? Please give number of miles run between turnings?

Replies to be sent to Mr. John Mackenzie, Superintendent of Motive Power, New York, Chicago & St. Louis, Cleveland, O.

EFFICIENCY OF THE LINK AS COMPARED WITH OTHER VALVE MOTIONS.

The committee to report at the next annual meeting of the Association desire information regarding the link and other valve motions.

1st. Results of tests made with a view of comparing the link with other valve motions.

2d. Indicator diagrams taken from engines in service equipped with the link and other valve motions. Give diameter and stroke of cylinder, lap, lead and travel of valve, and size of steam and exhaust ports.

3d. Cost of fitting up new, and maintenance, as compared with the link motion.

4th. Blue prints or drawings of valve motions.

5th. Have the results demonstrated that the motions tested were so far superior to the link that you would equip locomotives with them in preference to the link? If so, please give your reasons for so doing; if otherwise, state objections.

Any information regarding form of valve motions, other than the link, that you deem interesting the committee will be pleased to receive. It is to be hoped that you may be enabled to comply with this request, as a creditable and reliable report on so important a subject is very much to be desired. You will increase the obligation by forwarding the information at your earliest convenience.

Answers should be addressed to Mr. James M. Boon, West Shore Railway, Frankfort, N. Y.

The St. Clair Tunnel.

An engineer writes as follows of the progress of this work: Ever since we have started we have been working through clay, with occasional very small pockets of sand. We have only struck about eight or ten boulders since the beginning of the work, and these we have had no difficulty in dealing with. During the month of January we made 289 ft. on the Canadian side, and 276 ft. on the American, which gives an average daily progress for both sides of 18.550 ft. The total length of tunnel finished up to Saturday last was 1,020 ft. on the Canadian and 1,314 ft. on the American side.

Rails Sold and Shipped in 1888 and 1889.

The statement of the Board of Control for 1889 makes the following exhibit of rails of 50 lbs. per yard and over sold in 1888 and 1889:

	1888 Gross tons.	1889 Gross tons.
North Chicago.....	161,945
Union.....	126,016
Joliet.....	114,675
Illinois Steel Co.....	402,636	401,795
Carnegie Bros. & Co.....	138,946	297,461
Scranton Steel Co.....	136,629	155,814
Lackawanna Coal & Iron Co.....	128,310	139,141
Bethlehem Iron Co.....	85,448	121,262
Pennsylvania Steel Co.....	121,900	108,931
Cambria Iron Co.....	82,363	64,947
Cleveland Rolling Mill Co.....	29,940	14,807
Troy Steel & Iron Co.....	25,110	2,280
Western Steel Co.....	39,168
Worcester Steel Co.....	6,569
Springfield Iron Co.....	3,705
Totals.....	1,200,184	1,271,538

In this statement the output of light rails, which is estimated at about 150,000 tons for the year, is not included, and the product of the Allegheny Bessemer Steel Company, of Pittsburgh, is also not embraced. The product of the latter company last year is estimated to be about 60,000 tons, which would make the total product of rails for last year approximately 1,480,000 tons.

THE SCRAP HEAP.

Notes.

The Atchison, Topeka & Santa Fe has reduced the schedule of its through fast freights between Kansas City and California 24 hours.

The wife of Senator Fair, of California, left New York on the evening of Feb. 11 in a Wagner car, the interior of which was decorated with flowers costing \$1,000.

Eleven switchmen have been laid off in the Susquehanna yards of the Erie on account of their fondness for drinking. The management of the road will, it is said, discharge every man who indulges in liquor to any extent.—*Exchange*.

On Tuesday of this week a special train engaged for the purpose of carrying a messenger with 200 shares of bank stock ran from Philadelphia to New York over the Philadelphia & Reading and the Central of New Jersey in one hour and 38 minutes; the distance is 89.4 miles.

Members of the South Dakota Legislature in traveling from the Black Hills country to the seat of government go via Norfolk, Neb., and Sioux City, Ia., making a round trip of about 1,700 miles. There are 20 members from that part of the state, and their mileage foots up, for two trips, \$6,800.

The Chicago, St. Paul & Kansas City has reduced the running time of through trains between Minneapolis and Chicago 30 minutes, making it 13½ hours. The two old lines and the Burlington have made similar accelerations, and the Chicago & Northwestern threatens to shorten the time an hour or two more.

The Central Railroad of New Jersey is building a new station at Keyport, N. J. It will cost about \$2,500. The same road has just completed plans for a new station at Somerville, N. J. The lower part will be built of stone, the upper part of wood. It will be the handsomest of all the smaller stations along the line.

The brakemen and conductors in the freight yard of the New York Central & Hudson River, at Suspension Bridge, about 35 men in all, refused to work last Sunday because they were not allowed satisfactory pay for Sunday work. The men reported for work on Monday, but both strikers and the night men were laid off pending a settlement. Yard work was carried on under difficulties for several days.

The Attorney General of Iowa will at once enter suits against the Chicago, Rock Island & Pacific, the Burlington, Cedar Rapids & Northern, and the Minneapolis & St. Louis, to compel answers to the questions sent out by the Governor's orders a few months ago. It will be remembered that information was demanded concerning the salaries of officers, number of attorneys, names of stockholders and number of mileage books, and that the roads refused or neglected to answer.

An engineer has recovered a verdict of \$21,850 from the New York, Lake Erie & Western, for injuries received in jumping to avoid a collision, at Akron, Ohio, two years ago.

A woman has secured a verdict against the Vicksburg, Shreveport & Pacific for \$30,000. Her only son, a fireman on the road, was killed by an engine turning over on him and scalding him to death. He was the second son of the plaintiff killed on the defendants' road.

I am unable to perceive any just reason why the families of railroad employes should be allowed to travel over the railroads at the expense of the other people. As a rule railroad employes are better paid than persons of like capacity in other vocations, and to make the exception in their favor of transportation of their families free would simply be in the line of odious class legislation, with which the country has been so cursed for the last twenty years or more.—*Senator Reagan, of Texas*.

Blast Furnace and Rail Production.

The Bulletin of the American Iron and Steel Association gives the following notes of the production of furnace F at the Edgar Thomson Steel Works for the months of November, December and January last:

	Pounds of coke	per gross ton
	Gross	of iron pro-
	tons.	duced.
November.....	9,097	1,897
December.....	10,665	1,756
January.....	16,530	1,757
Best week's output.....	2,462	1,702
Best day's output.....	457	

Five such furnaces running through the year, with one other running through less than three months would have more than made the 635,164 tons of iron the United States produced in 1881, and it would have taken over 60 furnaces of like capacity for the production of last year.

At the steel works the output of rails for January was the largest in their history, the daily average production exceeding 1,100 tons, and one day it reached 1,250. On the night of Jan. 23 the output in 12 hours was 25,020 rails, as against 16,000 in 8 hours, the best previous record.

Fluctuations in the Price of English Pig-Iron Warrants.

The Iron Trade Circular, referring to the contests between the bulls and bears in the iron market, says: "An analysis of the course of the warrant market shows that the bears have won 14 times and the bulls 14 times during three months." The state of the market at the commencement and at the end of the three months was as below:

	Oct. 28, 1889.	Jan. 30, 1890
	Per ton.	Per ton.
Hematite warrants.....	69s. 7½d.	69s. 3d.
Hematite makers' prices.....	70s.	80s. to 85s.
Steel ship plates.....	£7 15s.	£10 15s.

In the interim the prices have been as high as 82s., Jan. 6 and 7. The 14 rises have varied between 9d. and 8s. 6d., and the falls between 9d. and 7s. "Though hematite warrants are quoted in the table, Scotch and Middlesbrough iron have been 'bulled' and 'beared' in about the same way." The fall of 7s., which occurred between Jan. 21 and 30, produced a panic in the market, though the makers held to their price, and the Circular has received no news from any source, either at home or from abroad, except that which is encouraging. Wages are still increasing, and the production is behind the demand. The conclusion is that the fall is the result of pure speculation.

German Railroad Affairs.

There seems a growing tendency to introduce American styles of rolling stock on German railroads. Tank cars for carrying petroleum, or boiler wagons as the Germans call them, carrying 70 barrels, or 13,000 litres, are being increasingly employed and the railroad authorities are encouraging their use by granting a low tariff, as the impending introduction of tank boats on the Rhine threatens the traffic. At a general meeting of the Association of German Ironmasters lately held at Dussel-

dorf, resolutions were unanimously adopted requesting the adoption, for bulk goods, of wagons of the utmost possible capacity, and requesting experiments to be made in the use of cars of a carrying capacity of 30 tons as soon as possible by the Prussian State Railroads.

Effects of High Prices of Iron in England.

Iron reports, "on good authority," the first serious check on consumption through the present high prices of iron and steel goods in England, and this is, as reported, a serious one. The report is that the Indian Government has telegraphed home canceling all indents sent over for steel ties—an order affecting 25,000 or 30,000 tons. The reason assigned is that at present prices wood is cheaper than steel. Iron considers this unfortunate, as, if steel ties are given up for wood, it may be difficult to reintroduce them even when prices fall again to their normal level.

Elevated Roads in Philadelphia.

A Philadelphia dispatch says that "the Citizens' Committee of Fifty, selected at a recent town meeting in Philadelphia to promote and further the interests of the Philadelphia & Reading Elevated terminal and the Belt Line, along the Delaware River front, has adopted resolutions declaring that every indication shows that the community is desirous that the necessary authority should be granted by City Councils for the promotion of these two interests, which virtually affect the welfare of the city, but that the wishes of the citizens are thwarted by their servants in Select and Common Councils. Prompt action is now demanded, the resolutions declare, and the committee will, at the coming city election, Feb. 18, without reference to party politics, make every effort to cause the defeat of all candidates who have obstructed or delayed these projects. The committee say that they speak advisedly when they declare that corrupt work is now being done in the Council chambers to thwart the wishes and interests of the citizens."

New Railroad in Costa Rica.

The Government of Costa Rica has just issued a grant to an English company to build a railroad from San Jose to Esparada. The proposed line is 36 miles long, and with existing roads will complete an interoceanic railroad. Although the country is mountainous, there are no very difficult engineering problems connected with the building of the road.

The Verdict on the Carmel (Ind.) Wreck.

The Coroner finds that the trestle had been repaired and strengthened two weeks prior to the accident, and that its condition was not the direct cause of the wreck. In summing up the evidence, however, he says: "I find that on the curve, 178 ft. north of the trestle, one rail had been raised by placing blocks from ¾ to 1 in. in thickness on 17 consecutive ties, and that spikes the usual length—5½ in.—had been used to secure it. Many of the ties not being sound at the point where the spikes were driven, this rail turned and caused the train to leave the track and go through the bridge." The Coroner censures the management of the road.

Free Libraries for Pittsburgh and Allegheny.

Andrew Carnegie has offered to spend not less than \$1,000,000 for a central free library and branches for the city of Pittsburgh, provided the city will maintain them. The free library for Allegheny City, on which Mr. Carnegie has expended \$300,000, will be opened by President Harrison this week.

Arbitration for Discharged Conductors.

J. D. Hearne, H. C. Urner and the Rev. Father Mackey, the arbitrators appointed at Cincinnati to settle the differences between the Cincinnati, New Orleans & Texas Pacific and the Brotherhood of Railway Conductors, arising from the discharge of sixteen men, have decided that the road must reinstate the men in their respective places on the divisions on which they were formerly employed or any other division operated by the company, or pay a sum equal to four months' wages for each man at the rate of \$90 per month. The company had offered to pay the men to Feb. 18. The only reason thus far given for the dismissal of the conductors is that they belong to the Brotherhood.

Sleeping-Car Taxes in Iowa.

All the county treasurers in Iowa have received notice that an injunction has been issued from the United States Court restraining them from collecting taxes levied against the Pullman Palace Car Co. The company has been fighting these assessments for several years, and the injunction is the result of a test case brought by Treasurer Ryan, of Webster County. The assessment against the Pullman Co. is \$50 per mile on all roads over which its cars run.

The Siberian Railroad.

It is confidently stated that the Russian government will begin in the spring its great railroad line across Siberia; that work will be started simultaneously at Vladivostok on the Pacific, and at the present eastern terminus of the railroad system. Gen. Annenkoff proposes that the lines shall follow an almost straight line, south of the fifty fifth parallel, for a considerable part of its length. The total length of the line is to be 4,375 miles.

Worms that Eat Steel.

The old yarn about the worm which is destroying the steel rails of Germany is again on its rounds. We quote from a contemporary: "There is no exaggeration," says the official report, "in the assertion that this creature is one of the most voracious, for it has devoured 36 kilograms of rails in a fortnight." It does not appear whether or not one worm or more ate the 36 kilograms of steel in a fortnight.

Kentucky Cannel Coal for Italy.

It is a fact not generally known that a great deal of Kentucky coal is shipped to all parts of the civilized world. One of the principal of these markets is Italy. Hundreds of tons of the smooth, jet-like blocks from beneath Kentucky's grassy soil find their way to the Italian shore. There the cannel coal is used in the production of gas that lights up many a fairy scene, where the sun-kissed signorinas listen to the words of the gallants at their side. This month 150 carloads from Cloverport will go to Genoa.—*Louisville Post*.

Rails Kept Tolerably Warm.

The movement of freight over the Middle Division of the Pennsylvania Railroad for the month of January was the largest in the history of the road. There were 120,492 cars passed Mifflin, east and west, during the month in 2,291 trains. This is an increase of 7,300 cars, or about 6½ per cent. over January, 1889. This equals 37 trains daily in each direction, and an average of 54 cars per train.

RAILROAD LAW—NOTES OF DECISIONS.

Powers, Liabilities and Regulation of Railroads.

An Iowa statute provides that when work in the construction of a railroad has ceased, and has not been in good faith resumed for a period of eight years, the land on which the road is being built shall revert to the owner of the tract from which it was taken. The Superior Court decides that the statute does not interfere with vested rights or impair the obligations of contracts.

In Kentucky the Court of Appeals holds that the statute providing that if cattle shall be killed on the track of a railroad company adjoining lands belonging to or in the occupation of the owner of the cattle, who has not received compensation for fencing the land, the loss shall be divided between the railroad and the owner of the cattle, is not unconstitutional as depriving defendant of its property by fixing upon it liabilities not imposed on other citizens, as the same liability is imposed upon all such corporations for the protection of person and property, in consideration of the exclusive or extraordinary privileges granted them.

The defendant railroad was permitted to build a portion of its road in Pennsylvania, on payment of \$10,000 annually to the state after its completion. The Supreme Court of that state holds that the act of June, 1885, taxing the indebtedness of corporations doing business in the state, and compelling them to collect such tax, applied to such company, and did not impair the obligation of the contract between the state and the corporation, as set forth in the above private statutes.

The Supreme Court of Michigan decides that a railroad which has neither station houses, side tracks, turn tables, nor rolling stock, and which has leased what it uses about as long as it can, and is unable to furnish what is necessary for its successful operation, is uncompleted, within the meaning of that word in a statute.

In Texas a contract for grading the road of a railroad company contained the following stipulation as to the compensation to be paid: "Earth work, per cubic yard, 23 cents; solid rock, per cubic yard, \$1.22½; loose rock, per cubic yard, 90 cents; compact gravel, per cubic yard, 35 cents; side-hill exca. rock, per cubic yard, 90 cents; rock embankment, per cubic yard, 30 cents." The contract referred to annexed specifications, but none were in fact annexed. The company's engineer produced a copy of certain specifications, which, as he testified, had been furnished the contractor. These provided that "the measurement of quantities will usually be made in the cuts or pits from which the material has been taken. When quantities are determined by a measurement of embankments the engineer will estimate the actual quantity, and no allowance will be made for shrinkage." For the first month or two the embankments were actually measured, and the estimates were made and paid for on that basis. All succeeding payments were made on the basis of excavation measurements, but the excavation measurements were arrived at by taking the measurement of the embankments composed of the contents and deducting a certain per cent. The Supreme Court decides that, as the embankments were actually measured, the contractor was entitled, both by the contract and the specifications, to payment for the actual cubic yards of embankments. The contract provided the following rate of compensation for hauling from excavation to embankment: "Average overhaul, two cents per yard per 100 ft. Free haul, per cubic yard, 100 ft. Overhaul outside right of way to include actual haul, two cents per yard per 100 ft. One hundred feet of embankment free dirt."

The above price for excavation includes delivery into banks, where the extreme haul does not exceed 2,000 ft. Where the haul exceeds 100 ft., the price for haul will be on average overhaul two cents per cubic yard per 100 ft. The extreme haul, however shall not exceed 2,000 ft. It appeared that in every instance the overhaul from excavation to embankment was allowed and paid for by excavation measurement. The Supreme Court decides, that this showed that the contractor was to receive compensation for hauling from cut to embankment, and that it was proper to refuse to charge, in an action on the contract, that the contractor was not entitled to compensation unless the overhaul exceeded 2,000 ft.

In Iowa the Supreme Court rules that a railroad organized under the laws of Iowa is a resident, within the meaning of the word in a statute, of each county through which it operates its road.

In Wisconsin the Supreme Court holds that a railroad can be compelled by mandatory injunction to restore a public street which it has torn up in constructing its crossing to its former state of usefulness, where such restoration is a statutory condition of the right to build the crossing, and it is no objection to the injunction that the city might repair the injury, and recover damages of the railroad company.

Carriage of Goods and Injuries to Property.

In New York the plaintiff received from a railroad a driver's pass, containing conditions to the effect that the party who accepted and used it assumed all risk of accident, and expressly agreed "that this company shall not be liable under any circumstances, whether through the negligence of its servants or otherwise, for any personal injury, or loss, or damage to property, or any delay he may sustain during transportation." The Supreme Court holds in an action for failure to deliver cars for shipment of stock, that the court properly charged that, if the damages sued for accrued prior to the time the stock left the point where they were loaded on cars, and before the pass was delivered to plaintiff, the acceptance of the pass was not a waiver or bar to the action.

In Illinois the Federal Court rules that a railroad which, by its agent, receives and checks as personal baggage a trunk containing jewelry, the agent knowing or having reason to believe that the trunk contains jewelry, and not wearing apparel, is liable for loss of the property.

In Iowa the plaintiff had nine cattle killed at the same point on defendant's road within a period of two years. The killing each time was by a night passenger train running on a schedule of from 35 to 38 miles per hour, with head-light and air-brakes in perfect order, and which gave the proper signals for crossings. The place of the accident was an ordinary crossing in the open country, and there was nothing to indicate that it was a crossing where cattle were liable to be, except the fact that plaintiff's cattle were killed there. It appeared that the cattle were seen when the train was about 300 ft. distant, the utmost distance at which objects are visible by the aid of a head-light; that the train could not have been stopped at a less distance than 1,200 ft.; that it was dangerous to the train and passengers to strike objects like cattle at a slow rate of speed; and that the collision could not have been avoided unless the train had approached the crossing at a speed not exceed-

ing 15 miles per hour. The Supreme Court holds that the railroad is not liable.¹⁰

In Michigan a railroad company's rules prohibited its trains from passing stations at a greater speed than 15 miles per hour, and required the watchmen to signal the engineer whether the track was clear. A passenger train passed at 30 miles per hour, and the watchman signaled that the track was clear, when, in fact, there were a number of sheep on the track, without the company's fault, 150 rods from the station, which sheep were run over and killed. The night was bright, and the watchman stated that he looked and saw nothing ahead. It was not shown that the sheep could have been seen at that distance. The Supreme Court decides that the company was not negligent, as the rate of speed was not unusual, and the rules mentioned were intended only for the protection of persons and property at stations.¹¹

In Minnesota the Supreme Court rules that when a railroad occupies a public street in a city or village, subject to the public easement, it is not entitled to fence its track, and thereby obstruct the street and interfere with its use; and it is, therefore, not liable for stock killed because of a failure to so fence its track.¹²

In New York the Court of Appeals holds that the fact that the fire set by defendant's locomotive passed through lands of another before reaching plaintiff's woods does not render defendant's negligence the less the proximate cause of the destruction of such woods by fire.¹³

Injuries to Passengers, Employees and Strangers.

In Georgia the Supreme Court holds that a man in charge of the track, and the engineer of a locomotive running thereon, are "fellow-servants."¹⁴ In this case the plaintiff, suing for injuries received, alleged that he had charge of the track, and had the duty of repairing it; that it was in a "fearfully bad condition; that he could not repair all the road within the time he worked, but had improved it so as to be safe; that on resuming work after a week's illness he was employed near the end of the road, and had not been over the entire track for two weeks or more; that when going out on a load of ties the train ran into a bad place in the track, jolted the ties, threw him from the cars, and severely injured him; that the engineer, whose duty and habit it was to inform him of bad places in the track, knew of this one, and that plaintiff was ignorant of it, but did not inform him thereof until just as the accident occurred, and too late for him to avoid injury. The Supreme Court holds the railroad not liable.¹⁵

A South Carolina statute provides that every railroad shall be liable for damages caused by fire originating within the limits of its right of way, by the act of any of its "authorized agents or employees." A railroad made a contract with H., a railroad contractor, for the grading of a section of its road, whereby H. was to employ and pay the laborers, and do the work subject to the approval of its engineer; to increase the force of laborers whenever required by the engineer; to discharge any laborer who might be offensive to defendant. If he failed to complete the work within the time stipulated, the railroad was authorized to employ laborers and complete it at his expense. He agreed to remove or burn up all trees, logs and other perishable material along the line of the road, and to be responsible for damages as between himself and the railroad, whose assistant engineer was to personally direct the execution of the work. The Supreme Court holds that H. was an independent contractor and not an "authorized agent or employee" of the railroad within the meaning of the above statute.¹⁶

The Supreme Court of Iowa rules that the giving of an order to an inexperienced brakeman to uncouple an engine from a train while in motion does not support an allegation of negligence, where the uncontradicted testimony of the engineer shows that he had explained quite fully to the brakeman how to make that particular uncoupling immediately before, and told him to take hold of the handle and secure a sure foothold at the end of the car before giving the signal to move the engine; and it appeared that it was more practicable, and the common practice under the circumstances, to make the uncoupling while the train was in motion.¹⁷

In New York the Court of Appeals holds that where an accident to a brakeman occurs, caused by a defective car moving slowly, the fact that such an accident might occur when it is moving rapidly, even if in good order, does not bring the accident within the risks of his employment.¹⁸

Kansas City, St. Louis & Chicago, annual, 511 Olive street, St. Louis, Mo., March 11.

Manhattan Elevated, special, 71 Broadway, New York City, Feb. 26.

Missouri Pacific, annual, St. Louis, Mo., March 11.

New Orleans & Northeastern, annual, New Orleans, La., March 3.

New York, Susquehanna & Western, annual, 15 Cortlandt street, New York City, Feb. 27.

St. Louis, Iron Mountain & Southern, annual, St. Louis, Mo., March 11.

Railroad and Technical Meetings.

Meetings and conventions of railroad associations and technical societies will be held as follows:

The American Association of General Passenger and Ticket Agents will hold its next annual convention in the City of Mexico, Mex., March 8.

The Master Car Builders' Association will hold its next annual convention at Old Point Comfort, Va., June 10. Rooms should be secured of Mr. F. N. Pike, manager, Hygeia Hotel, Fortress Monroe, Va.

The New England Railroad Club meets at its rooms in the United States Hotel, Beach street, Boston, on the second Wednesday of each month, except June, July and August.

The Western Railway Club holds regular meetings on the third Tuesday in each month, except June, July and August, at its rooms in the Phenix Building, Jackson street, Chicago, at 2 p. m.

The New York Railroad Club meets at its rooms, 113 Liberty street, New York City, at 7:30 p. m., on the third Thursday in each month.

The Central Railway Club meets at the Tift House, Buffalo, the fourth Wednesday of January, March, May, August and October.

The Northwest Railroad Club meets on the first Saturday of each month in the St. Paul Union Station at 7:30 p. m.

The Northwestern Track and Bridge Association meets on the Saturday following the second Wednesday of each month at 7:30 p. m. in the director's room of the St. Paul Union station, except in the months of July and August.

The American Society of Civil Engineers holds its regular meeting on the first and third Wednesday in each month, at the House of the Society, 127 East Twenty-third street, New York.

The Boston Society of Civil Engineers holds its regular meetings at Boston, at 7:30 p. m., on the third Wednesday in each month. The next meeting will be held at the American House.

The Western Society of Engineers holds its regular meetings at its hall, No. 67 Washington street, Chicago, at 7:30 p. m., on the first Tuesday in each month.

The Engineers' Club of St. Louis holds regular meetings in St. Louis on the first and third Wednesdays in each month.

The Engineers' Club of Philadelphia holds regular meetings at the house of the Club, 1,122 Girard street, Philadelphia.

The Engineers' Society of Western Pennsylvania holds regular meetings on the third Tuesday in each month, at 7:30 p. m., at its rooms in the Penn Building, Pittsburgh, Pa.

The Engineers' Club of Cincinnati holds its regular meetings at 8 p. m. on the third Thursday of each month at the Club rooms, No. 24 West Fourth street, Cincinnati.

The Civil Engineers' Club of Cleveland holds regular meetings on the second Tuesday of each month, at 8:00 p. m., in the Case Library Building, Cleveland. Semi-monthly meetings are held on the Fourth Tuesday of the month.

The Engineers' Club of Kansas City meets at Kansas City, Mo., on the first Monday in each month.

The Engineering Association of the Southwest holds regular meetings on the second Thursday evening of each month at 8 o'clock, at the Association headquarters, Nos. 63 and 64 Baxter Court, Nashville, Tenn.

The Civil Engineers' Society of St. Paul meets at St. Paul, Minn., on the first Monday in each month.

The Montana Society of Civil Engineers meets at Helena, Mont., at 7:30 p. m., on the third Saturday in each month.

The Civil Engineers' Club of Kansas holds regular meetings on the first Wednesday in each month at Wichita, Kan.

American Institute of Electrical Engineers.

The forty-third meeting of the Institute will be held Feb. 18, at 8 o'clock p. m., at the house of the American Society of Civil Engineers, 127 East Twenty-third street. A paper by William Mayer, Jr., Electrician of the Consolidated Telegraph and Electrical Subway Co., on "The Practical Working of the Electrical Subways of New York City," will be read.

American Society of Civil Engineers.

The proposed amendments to the constitution have been regularly submitted by the Committee on Revision of the Constitution and By-Laws, and have been duly sent by letter to the several members of the society. They have been discussed at the annual meeting, and not changed by that meeting. They are now submitted to letter ballot of the society. The ballot will close March 5.

Association of Dominion Land Surveyors.

The seventh annual meeting will be held in St. Andrew's Hall, Ottawa, Ont., Feb. 18 and 19. Among the papers will be: "Want of Precision in Surveys," by John McLatchie; "Hydrographic Surveying," by Staff Commander J. G. Boulton, R. N.; "The Railway Belt in British Columbia," Otto J. Klotz, and "Plans and Field Notes of Surveys of Dominion Lands," by P. B. Symes.

Engineers' Club of Kansas City.

Following is the programme for the Spring of 1890: Feb. 3—"Some Geological Field Work in Southern Missouri," Thomas Knight.

March 3—"Photography Applied to Surveying," G. W. Pearsons.

April 7—"Widening and Changing Alignment of Bluff St. Bridge, Metropolitan Street Railway," E. I. Farnsworth.

May 5—"The Evolution of the Elevator," Robt. M. Sheridan.

June 2—"Municipal Surveys," D. W. Pike. Discussions on the above papers are invited.

Engineers' Club of St. Louis.

The 321st meeting was held Feb. 5, 1890, President Nipher in the Chair; 27 members and three visitors present. The following were elected members: J. I. Ayers, C. W. Connet, B. L. Crosby, J. H. Curtis, G. H. French and A. Winslow.

Mr. George W. Dudley read a paper on "Tests of

Water-Works Engines." He submitted reports in detail of two tests of compound condensing duplex direct-acting pumping engines, one of 3,000,000 gallons capacity per 24 hours, giving a duty of about 62,500,000 ft. lbs. per hundred pounds of coal; the other of 5,000,000 gallons capacity, giving a duty of about 75,000,000.

In the discussion Mr. Bryan called attention to a simple rule for comparing the efficiency of pumping engines with ordinary steam engines, the evaporation in pounds of water per horse power per hour being equivalent to the constant 1980, divided by the duty expressed in millions of foot pounds, based upon ten to one evaporation. He called attention to remarkable results that were being guaranteed by makers of compound and triple expansion condensing engines now being built for electric light purposes.

Professor Johnson stated that if due allowance were made for engine friction, he thought the results would not be so unfavorable to pumping engines as shown by Mr. Bryan.

Professor Gale stated that pumping engines were subject to certain losses, due to friction for which they were given no credit. This being allowed for, the efficiency would be increased. He also showed that the cost of high duty engines was an important item, as the increased interest and depreciation accounts might overbalance the saving.

Mr. Holman called attention to the relative importance of duty as compared with other items of expense in pumping water. In this city the coal bill was less than half of the total cost, the items of labor and repairs being of almost equal importance. He also expressed great doubt as to the reliability of the tests of the old Cornish pumping engines, which were usually held up as standards.

The secretary then read for Mr. J. H. Kinealy a paper entitled "Some Mathematics on Ventilation." The author tested the commonly accepted rules of practice by mathematical deduction, with the result of showing the practice to be well founded.

New England Railroad Club.

The following circular is sent out:

The New England Railroad Club has assigned as the subject for discussion at its monthly meeting in March next "Freight Car Couplers." This subject, which has occupied the minds of railroad managers for several years and is still unsettled, has now attained a new interest from the fact that the President of the United States, in his message to the present Congress, has called its attention to this matter, and legislation is proposed making it compulsory on the railroad companies to adopt and use, within a given period, an automatic freight car coupler. As this proposed legislation is based entirely upon the object of lessening the danger to employes engaged in handling cars, we deem it fair that these men should be given an opportunity to express their ideas as to the form of coupler which best combines uniformity, automatic action and safety. With this view, the New England Railroad Club proposes, with the co-operation of the managements of the different railroads in New England, to get the opinion of every person engaged in coupling freight cars as to the safest and best coupler. The management of your road has kindly consented to forward your replies to the undersigned. Please sign your names in the form below, under the type of coupler which you recommend.

Then follows a blank to be filled up by employes according to their preferences.

Northwestern Railroad Club.

A meeting of this club was held Feb. 8, in the Directors' Room, at the Union Depot, St. Paul. The subject for discussion was the recent circular of the Master Mechanics' Association, in regard to axles for heavy tenders, introduced by Mr. W. H. Lewis.

The Northwestern Track and Bridge Association.

The Northwestern Track and Bridge Association meets Feb. 15 in St. Paul. Subjects for discussion, Mr. Geo. W. Kimball's paper on "Track Shimming," read at the last meeting, and the paper to be read by Mr. John Copeland on the "Care of Pile Bridge in Winter."

Western Railway Club.

The Club holds its next meeting on Tuesday, Feb. 18, at 2 p. m., at its rooms in the Phenix building, Chicago. The subject for discussion will be "Steel Plate and Malleable Iron in Car Construction," to be opened by Mr. E. W. McK. Hughes, Chief Engineer of the Fox Solid Pressed Steel Company, and Superintendent of Locomotives of the Northern State Railways of India.

The subject of Link and Other Valve Motions, continued from last meeting will also come up for discussion.

The arbitration committee of the M. C. B. Association has asked the Club for suggestions as to the changes in the Interchange Rules. Members are requested to come prepared to offer suggestions.

The two following topics are underlined for brief informal discussions, viz: Best Method of Balancing Reciprocating Parts of Locomotives, and Relative Merits of Iron, Wood, and Composition Roofs.

The heads of car departments of Chicago roads will meet at the club rooms at 10 a. m. of the club meeting day, to receive report of committee on card and rules to govern city interchange.

Western Society of Engineers.

At a meeting held Feb. 5, President L. E. Cooley made an address outlining the policy for the Society for the coming year. Mr. Octave Chanute, who went to Paris to co-operate with Mr. Jeffery in preparing a report on the Exposition for the Chicago World's Fair Committee, gave an account of the Exposition as he saw it, and stated some of the bearings which the experience of that Exposition had upon the American World's Fair project. In his opinion there is time enough still to open a fair on the first of May, 1892, if the work is taken up at once energetically.

PERSONAL.

—Mr. J. M. Phillips, formerly Superintendent of the Gulf, Colorado & Santa Fe, has been appointed a Division Superintendent on the Central of Georgia.

—Judge Cooley is now on his way to Mexico for a short vacation. His health is very much improved and he hopes to return to his duties within a few weeks.

—Mr. John B. Winslow died Feb. 10 in Boston, after a brief illness. He was well known in Boston, and was for many years Superintendent of the Boston & Lowell road.

General Railroad News.

MEETINGS AND ANNOUNCEMENTS.

Dividends.

Dividends on the capital stocks of railroad companies have been declared as follows:

Chicago & Alton, quarterly, 2 per cent. on the common and preferred stock, payable March 1.

Chicago, Burlington & Quincy, quarterly, 1½ per cent., payable March 15.

Chicago & West Michigan, 1 per cent., payable Feb. 15.

Cleveland & Pittsburgh, quarterly, 1½ per cent., payable March 1.

Meetings.

Meetings of the stockholders of railroad companies will be held as follows:

Cincinnati & Springfield, annual, Central Union Depot, Cincinnati, O., Feb. 19.

Delaware, Lackawanna & Western, annual, 26 Exchange Place, New York City, Feb. 28.

Denver, Texas & Fort Worth, special, Denver, Col., Feb. 20, to act upon a proposed consolidation with the Union Pacific system in Colorado.

Illinois Central, annual, Chicago, Ill., March 12.

Indianapolis, Decatur & Western, special, Indianapolis, Ind., Feb. 18.

- ¹ Skillman v. C. M. & St. P. R. Co., 43 N. W. Rep., 275.
- ² L. & N. R. Co. v. Belcher, 12 S. W. Rep., 195.
- ³ N. Y. L. E. & W. R. Co. v. Com., 18 Atl. Rep., 412.
- ⁴ Young v. T. & S. H. R. Co., 43 N. W. Rep., 632.
- ⁵ G. H. & S. A. R. Co. v. Johnson, 11 S. W. Rep., 1113.
- ⁶ C. R. I. & P. R. Co. v. Ellithorpe, 43 N. W. Rep., 277.
- ⁷ Ohko h v. M. & L. W. R. Co., 43 N. W. Rep., 489.
- ⁸ Hastings v. N. Y. O. & W. R. Co., 6 N. Y. Supt., 836.
- ⁹ Central Trust Co. v. W. S. L. & P. R. Co., 39 Fed. Rep., 417.
- ¹⁰ Connyers v. S. C. & P. R. Co., 43 N. W. Rep., 267.
- ¹¹ Stern v. Mich. Cent. R. Co., 43 N. W. Rep., 357.
- ¹² Rippe v. C. M. & St. P. R. Co., 43 N. W. Rep., 632.
- ¹³ O'Neill v. N. Y. O. & W. R. Co., 22 N. E. Rep., 217.
- ¹⁴ White v. Kennar, 9 S. E. Rep., 1082.
- ¹⁵ Ibid.
- ¹⁶ Rogers v. F. R. Co., 9 S. E. Rep., 1059.
- ¹⁷ Gorman v. M. & St. L. R. Co., 43 N. W. Rep., 303.
- ¹⁸ Goodrich v. N. Y. Cent. & H. R. Co., 22 N. E. Rep., 397.

—Mr. O. C. Gayley, lately Division Engineer of the Philadelphia & Reading at Williamsport, Pa., has been appointed General Manager of the Kansas City Car & Wheel Co.

—Mr. Percy Lumley, Chief Engineer of the Ore Belt road in Alabama, has resigned that position to become Resident Engineer of the Georgia, Carolina & Northern at Coronaca, S. C.

—Mr. A. B. Stickney has resigned the Presidency of the Iowa Central, a position which he assumed until the reorganization of the road had been completed. Russell Sage has been elected President to succeed Mr. Stickney.

—Mr. George T. Jarvis, formerly Superintendent of the Duluth, South Shore & Atlantic, has been appointed Superintendent of the Ohio Division of the Baltimore & Ohio, succeeding Mr. R. T. Devries, who has held the position for three years.

—Mr. George W. West, Master Mechanic of the Eastern Division of the New York, Lake Erie & Western, has been appointed Superintendent of Motive Power of the New York, Ontario & Western, to succeed Mr. H. Tandy, who resigned to go to the Brooks Locomotive Works.

—Mr. W. J. Haylow, Superintendent of the Savannah & Western division of the Central of Georgia, has been appointed Superintendent of Transportation of the Alabama Midland, the position which he held on that road when he resigned two months ago to accept service with the Central of Georgia.

—Mr. David Russell has been appointed Superintendent, and H. Tandy Assistant Superintendent of the Brooks Locomotive Works at Dunkirk. Mr. Russell was formerly Assistant Superintendent, and Mr. Tandy has been Superintendent of Motive Power of the New York, Ontario & Western, and was formerly with the Brooks Company.

—Mr. Thomas Warnock, Secretary and Auditor of the New York, Pennsylvania & Ohio, died at his home in Cleveland, O., Feb. 4, at the age of 70 years. He had been connected with the company since Feb. 1, 1873. Previous to that time he had been Purchasing Agent for the Chicago & Alton and Atlantic & Great Western companies. He had also been connected with the St. Louis, Kansas City & Northern, afterward merged with the Missouri Pacific.

—Mr. Henry Snyder, General Manager of the Union Switch & Signal Co., died at his home near Pittsburgh, Feb. 9, and was buried at Philadelphia on Wednesday. He had a wide acquaintance among railroad men, and his death will be regretted by them as a personal loss. Before Mr. Snyder became General Manager of the Union Switch and Signal Co. he had been agent for the Westinghouse Air Brake Co., and in both positions his energy and his loyalty have made him most useful to the interests that he served.

—Mr. John B. Mulliken, Vice-President and General Manager of the Chicago & West Michigan and General Manager of the Detroit, Lansing & Northern, has resigned, to take effect March 1, and will be succeeded by Mr. Charles M. Heald, lately President of the New York, Susquehanna & Western. Mr. Mulliken has been in the railroad service for 35 years. He was station agent at various places between 1855 and 1874. Between October, 1874, and May, 1875, he was Division Superintendent of the Chicago & Northwestern. Mr. Mulliken has since been connected with the Detroit, Lansing & Northern, first as General Superintendent, and since 1877 as General Manager.

—The Engineers who visited England the past summer will surely remember that genial and hospitable gentleman, Mr. Daniel Adamson, who assisted in entertaining the members of the American Engineering Societies at Manchester and at Horwich. Several of the party were invited to dine at his house, which is one of the most beautiful in the vicinity of Manchester. All will be grieved to learn of his death on Jan. 13 at his home at Didsbury Towers. His illness commenced with a violent cold, and was of several weeks duration. Mr. Adamson was a past president of the Iron and Steel Institute. He was one of the best known men in the engineering profession, he was a constant attendant at all meetings, and it was seldom that he did not speak. In his addresses he gave evidence of originality of thought, and his words always bore the stamp of personal conviction. He was closely allied to the Manchester ship canal project, and it will always be a monument to the energy and ability of Daniel Adamson. As an engineer he gained a reputation in two distinct fields, being the earliest to recognize the part that steel was destined to play in the arts of construction, and to discover the proper methods of manipulating it. He was among the pioneers in the use of high pressure steam in several successive cylinders. When once he had satisfied himself that a certain course of action was right, he never tired of impressing it upon the world. He was inventor of the Adamson flanged joint. He received the Bessemer medal in 1888 from the Iron and Steel Institute. He was born in 1818; was managing draughtsman and Superintending Engineer of the Stockton & Darlington Works under Mr. Gooch. In 1851, after occupying several prominent positions, he commenced business on his own account near Manchester as an engineer, iron founder, and boiler maker, and in 1872 built extensive works in that vicinity. He was foremost in drilling, instead of punching, rivet holes. He had taken out several patents on boiler seams, compound engines, and hydraulic lifting jacks, and many other devices. At the time of his death he was directing his attention to the improvement of ordinance, and was perfecting a breech-loading gun of his own design.

ELECTIONS AND APPOINTMENTS.

Atchison, Topeka & Santa Fe.—John G. Miller has been appointed Assistant General Agent of this company, with headquarters at Chicago, Ill., in charge of local business east of the Missouri River, and through business originating at or destined to points east of the Missouri River.

Baltimore & Ohio.—James G. Dagron has been appointed Engineer of Bridges with office in Baltimore, Md.

George W. Booth has been appointed Auditor of Revenue, with office in Baltimore, to succeed W. M. Buchanan, resigned.

George T. Jarvis has been appointed Superintendent of the Ohio division of the road, with office at Newark, O., vice R. T. Devries, resigned.

Baltimore & Ohio Southwestern.—John E. Rose, Master of Transportation, has been appointed Superintendent,

with headquarters at Chillicothe, O. The office of Master of Transportation has been abolished.

Birmingham Mineral.—W. D. Taylor has been appointed Engineer in Charge of Construction, with office at Birmingham.

Bridgeport & Decatur.—Henry Greathouse, M. W. Shoemaker, A. Devereaux, J. J. Lange, all of Wise County, Tex.; J. L. Wylie, of Davenport, Ia.; M. J. Richards, of Chicago; J. F. Hincley, of St. Louis, and W. J. Keller, W. D. Wylie, F. A. Wilmas, J. F. Elliott, A. L. Rossen, of Dallas, Tex., are the incorporators of the company.

Buffalo & Williamsville.—The directors of the road have elected the following officers: B. J. Tillman, President; F. D. Stow, Vice-President; Dr. T. M. Johnson, Treasurer; A. H. Roubush, Secretary.

Burlington & Missouri River.—J. C. Swartz has been appointed General Agent, with headquarters at Denver, Colo.

Cape Girardeau Southwestern.—E. F. Blomeyer, Assistant Superintendent, has been appointed Superintendent, with office at Cape Girardeau, Mo., to succeed W. A. Penny, resigned. He also still continues as General Freight and Passenger Agent. L. B. Houck, Purchasing Agent, has been made Assistant Manager and Paymaster.

Central of Georgia.—The directors this week elected John C. Calhoun, of New York, Vice President of the road, to fill a vacancy which has existed for two years.

Chicago & Northwestern.—E. F. Potter, Superintendent of Bridges and Buildings of the Dakota Central Division, has been appointed Engineer of the Wisconsin Division, with headquarters in Chicago.

Chicago, Rock Island & Pacific.—George F. Wilson has been appointed General Master Mechanic in place of T. B. Twombly, resigned, with jurisdiction over the lines both east and west of the Missouri River. His headquarters will be at Chicago. Harry Monkhouse has been appointed Assistant General Master Mechanic and Assistant Master Car Builder of the lines west of the Missouri River, with headquarters at Horton, Kan.

Chicago & West Michigan.—C. E. Fink has been appointed Car Accountant of the Chicago & West Michigan and Detroit, Lansing & Northern, with headquarters at Grand Rapids, Mich.

Cincinnati, Richmond & Chicago.—The following new board of directors was elected last week: T. D. Messler, W. D. Henghart, D. I. Gray, J. N. McCullough, J. T. Brooks, James McCrea, J. F. Miller, H. I. Miller and Ralph Peters. The board reorganized by electing T. D. Messler, president; S. B. Liggitt, secretary, and J. E. Davidson, treasurer.

Cincinnati, Saginaw & Mackinaw.—D. L. Tuttle has been appointed General Car Agent of this company, with headquarters at East Saginaw, Mich. He will report to the General Manager.

Cleveland, Cincinnati, Chicago & St. Louis.—The jurisdiction of John Egan, General Ticket Agent, has been extended over the Cairo division of the line, the Cairo, Vincennes & Chicago. J. J. Fletcher will continue as General Passenger Agent of the Cairo division.

Colorado, Kansas & Gulf.—The directors of this Kansas road are: Boardman F. Smith, William D. Weller, Parker Wright, S. M. Jackson, Vernon J. Miller, Thomas Morrison, Benjamin Howarth, A. Darroch, H. H. Rich and N. E. Sisson, all of Coldwater, Kan.

Columbus Southern.—C. H. Smith has been appointed General Freight and Passenger Agent of the company, with office in Columbus, Ga.

Fort Wayne, Cincinnati & Louisville.—J. D. Williams has been appointed Auditor, with office in Fort Wayne, Ind., to succeed J. M. Evans, resigned. A. S. Johnson, Car Accountant, having resigned, the duties will hereafter be performed by E. A. Wales, cashier.

Great Eastern.—The annual meeting of the shareholders of this company was held at Montreal last week. The following directors were elected: M. S. Loneragan, A. B. Chaffee, James Cooper, Thomas J. Turnbull, R. Prefontaine, M. P. Hon, F. X. O. Methot, and James F. Armstrong. M. S. Loneragan was elected President, A. B. Chaffee, Vice-President, and S. J. Simpson, Secretary-Treasurer.

Hornellsville, Coudersport & Westport.—The following are the incorporators of this Pennsylvania company, referred to last week: N. J. Peck, Coudersport, Pa., President; M. S. Blair, Angelica, N. Y.; L. T. Chapman and Charles Adset, Hornellsville, N. Y.; A. B. Crowell, F. C. Leonard, C. H. Armstrong and C. L. Peck, Coudersport, Pa.

Iowa Central.—Russell Sage was elected President at a recent meeting of the directors held in Chicago, to serve out the unexpired term of A. B. Stickney, who held the presidency temporarily pending the reorganization of the road. H. J. Morse, of New York, was chosen Vice-President in place of Mr. Sage, and E. H. Perkins, Jr., of New York, was elected Treasurer in place of Lewis Boyle, resigned.

Keokuk & Western.—At the annual meeting of the stockholders of the company, held at Keokuk, Feb. 6, the following directors were elected: T. De Witt Cuyler, Philadelphia; G. H. Candee, Benjamin Strong, John Paton, W. H. Gebhard and A. W. Spies, New York; F. T. Hughes and John M. Irwin, Keokuk, and F. M. Drake, Centerville.

Kettle Creek.—The incorporators are Edgar Munson, Williamsport, Pa., President; Hiram A. Merriman, Robert H. Munson, C. Larne Munson, David Bly and W. E. C. Merriman, Williamsport; George R. Curtis, Meriden, Conn.; Charles R. Noyes, Westport, Pa., and Jesse Munson, Bradford, N. Y.

Louisville Belt & Transfer.—John J. Barrett, F. F. Lutz, Edward Gallatti, John S. Morris, James E. Hubbert, Albert S. Brandeis, and J. N. Struck are the incorporators of this Kentucky road.

Martinsburg & Cumberland Valley.—At a meeting of the stockholders of the company the following directors were elected: T. B. Kennedy, John Stewart, B. F. Boyd, Chauncey Ives, A. L. Langdon, E. Boyd Faulkner, A. J. Thomas, W. T. Stewart, G. M. Bowers, P. A. Riddle, M. C. Kennedy, C. M. Davidson and Alexander Stewart, Jr. The board of directors elected T. B. Kennedy President, M. T. Ingles Secretary, and W. L. Richey Treasurer.

Mexican National.—C. R. Nail, lately Master of Trains for the East Tennessee, Virginia & Georgia, has been

appointed Division Superintendent, with headquarters at San Luis Potosi, Mex.

New London Northern.—At the annual meeting of the stockholders of the company in New London, Conn., the following directors were elected: Robert Coit, Augustus Brandegee, Jonathan N. Harris, C. Augustus Williams and Benjamin Stark, of New London; Thomas Ramsdell, of Windham; Charles H. Osgood, of Norwich; James A. Rumrille, of Springfield, and Thomas B. Eaton, of Worcester. At a subsequent meeting of the directors Robert Coit was re-elected President and Treasurer and J. A. Southard, Secretary.

New York Central & Hudson River.—Heretofore the financial department of the company has been under the charge of the First Vice-President, and the traffic department under the charge of the Second Vice-President. Changes were made this week which create an operating department to be under charge of a Third Vice-President, a new officer, who will be assisted by a General Manager, also a new officer, and by a General Superintendent. H. Walter Webb, who is Vice-President of the Wagner Palace Car Co., has been made Third Vice-President; John M. Toucey, General Superintendent, has been made General Manager, and Theodore Voorhees, Assistant General Superintendent, has been made General Superintendent.

New York & New England.—Charles A. Prince, a director of the company, has been appointed General-Solicitor to succeed R. M. Saltonstall, of Newton, retired.

New York, Ontario & Western.—George W. West has been appointed Superintendent of Motive Power of the road with office at Middletown, N. Y.

New York, Pennsylvania & Ohio.—John Roach, supervisor of the first section of the New York, Lake Erie & Western's eastern division, has been appointed Division Roadmaster of this line.

New York, Texas & Mexican.—The annual meeting of the stockholders was held at Victoria, Tex., Jan. 31. These directors were elected: C. P. Huntington, J. Kruttschmitt, F. S. Stockdale, A. Dacosta, C. C. Gibbs, D. C. Proctor and M. D. Monserratte. Officers: J. Kruttschmitt, President; M. D. Monserratte, Vice-President and General Superintendent; W. J. Craig, Treasurer, and C. J. Wells, Secretary.

North & South of Illinois.—The directors of the company have elected the following officers: President, Gerald L. Hoyt, of New York; Vice-President, C. H. Bosworth, of Springfield, Ill.; Secretary, J. W. Calhoun, of New York.

Pennsylvania, Poughkeepsie & Boston.—In addition to his duties as auditor, E. J. Fallon will, hereafter, have entire charge of the freight and passenger business of this company, with headquarters at Goshen, N. Y.

Philadelphia & Erie.—The annual meeting of the stockholders of this company, a leased line of the Pennsylvania, was held in Philadelphia, Feb. 10. The following managers were elected: W. Hazell Wilson, J. N. Du Barry, Wistar Morris, Samuel Gastine Thomson, N. Parker Shortridge, Henry D. Welsh, William J. Howard, William L. Elkins, Amos R. Little, J. Bayard Henry.

Port Edwards, Centralia & Northern.—The company recently chartered in Wisconsin has elected these officers: President, T. E. Nash; secretary, S. J. Wood, and treasurer, John Edwards.

Providence & Worcester.—At the annual meeting in Providence, R. I., this week, the following directors were elected: Moses B. I. Goddard, Joseph E. Davis, Oscar J. Rathbun, Jonas G. Clark, Benjamin F. Thurston, Charles E. Whitin, and George S. Barton.

Quebec & Boston Air Line.—This road, which is applying for a charter in Quebec, has the following incorporators: James Whyte, Leeds Village; William Wilson, of Wilson's Mills; P. Wallace Hall, François Theodore Lavoire, of Plessisville; and Andrew Whyte, of Leeds, P. Que.

Rio Grande Western.—L. J. Guinn, Trainmaster on the Denver & Rio Grande at Salida for several years, has resigned to become Trainmaster and Superintendent of Telegraph of this road, with headquarters at Salt Lake City.

St. Paul & Duluth.—George C. Gilfillan, Special Agent of the passenger department, has been appointed Assistant General Passenger Agent, with office in St. Paul. W. W. Broughton, General Agent in Minneapolis, has been appointed Assistant General Freight Agent, with headquarters in Minneapolis.

Schenectady & Albany.—The officers of this company are: Verplank Colvin, president; James Brown, chief engineer, and William L. M. Phelps, secretary and treasurer, all of Albany, N. Y.

Scioto Valley & New England.—The property of the Scioto Valley company has passed into the possession of the Scioto Valley & New England. The following officers have been elected: John Byrne, New York, President; C. Weidenfeld, New York, Vice-President; L. C. Newsom, Columbus, Treasurer; W. H. Whitney, New York, Secretary, and Charles O. Hunter, Columbus, Assistant Secretary. The following appointments have been made: Joseph Robinson, General Superintendent, and Frank Sullivan Smith, General Counsel. The office of the company is in Columbus, Ohio.

Toledo & South Haven.—The following are the directors and officers under the reorganization: R. B. Dobson, Charles D. Backus, W. G. Snow, William J. Nevins, Jr., all of New York; John Ihling, of Lawton; H. W. Williams and C. J. Monroe, of South Haven. R. B. Dobson is president and treasurer, C. J. Monroe, vice-president, John Ihling, manager and assistant treasurer, and W. G. Snow, secretary. The office is at South Bend, Ind.

Tuckahoe & Cape May.—The following have been elected directors of this company, referred to last week: Morris Boney, Charles W. Potts and George H. Becker, of Philadelphia; Anthony Steelman, T. Weeks, Tuckahoe; James Meccray and James E. Hildreth, Cape May City; Anderson Bourgeois, Estellville; Michael J. Kelly, George W. Urquhart, Thomas E. Ludlam and John J. O'Neill, of Sea Isle City; William R. Van Gilder, Petersburg, N. J.

Union Pacific, Denver & Gulf.—Frank B. Semple, Division Passenger Agent of the Union Pacific, has been appointed Assistant General Passenger Agent of this system, with headquarters at Denver.

Waldo & Somerset.—At the recent annual meeting of the company the following directors were chosen: V. R. Tuttle, Benjamin Chase, Amos Stevens, Ansel A. Goodridge, Frank F. Penney, Charles L. Alden, John Drew, E. N. Williams, G. H. Bean and C. P. Watson.

Western & Atlantic.—The following officers were re-elected at the annual meeting in Atlanta, Ga., last week: President, Joseph E. Brown; Treasurer, C. T. Watson; General Manager, R. A. Anderson; Traffic Manager, Joseph M. Brown, and Auditor, J. C. Courtney.

Western New York & Pennsylvania.—J. E. Shields has been appointed Assistant to the President, with office in New York City.

Wheeling & Lake Erie.—The annual meeting of the stockholders of the company was held at Toledo, O., last week. The old board of directors was re-elected, with the exception of James M. Ham and Eugene Zimmerman, who were succeeded by Eben K. Sibley and John Gresham, of New York City.

Wichita Valley.—The incorporators of this Texas company are E. W. Taylor, Morgan Jones, W. F. Stimmer, G. P. Meade, J. P. Smith, J. G. Jones, all of Fort Worth, Tex.; G. W. Dodge, and J. L. Granger, New York.

OLD AND NEW ROADS.

Alabama Midland.—Regular train service has been extended from Ozark to Troy, Ala. There are only six miles of track at Troy now remaining to be laid to complete the road between Bainbridge and Montgomery. Trains will probably be running into the latter city by Feb. 20. As the work is completed on this line the laborers are transferred to the Montgomery, Tuscaloosa & Memphis, north of Montgomery.

Baltimore & Eastern Shore.—Tracklaying has been completed from Tilghman's Point to the branch east of the Delaware & Chesapeake road.

Briarfield, Blockton & Birmingham.—The track laying from Montevallo, Ala., north has reached Gurnee, and has been commenced on the branch from Gurnee southwest to Blockton. The line between Gurnee and Bessemer will probably not be finished before the middle of the summer. The contracts for this section have not yet been let, but will probably be awarded before the end of this month.

Birmingham, Jackson & Kansas City.—The City Council of Jackson, Tenn., has ordered a special election on the proposition asking the city of Jackson to vote \$50,000 for building the line from Jackson northwest to Dyersburg or Newbern, a distance of about 40 miles.

Bowling Green Northern.—It is reported that H. P. Meyer of Louisville, Ky., was awarded the contract last week for building the section of this road from Bowling Green, Ky., north to the Falls of Rough, a distance of about 45 miles.

Brantford, Waterloo and Lake Erie.—This company is seeking power of the Dominion Parliament to build from Waterloo, or Hamilton, Ont., through Brantford, to a point on the Canada Southern in the County of Norfolk, or in the County of Haldimand. The right to issue bonds to the extent of \$40,000 a mile is asked for.

Bridgeport & Decatur.—The company has filed a charter at Austin, Tex., to build a road 10 miles long in Wise County, Tex. The capital stock is \$200,000.

Camden, Rockport & Rockland.—The company has asked the town of Camden to vote a subscription of \$40,000 to aid in the construction of the line from Camden to Rockland, Me., on the Knox & Lincoln road, a distance of about nine miles.

Canadian Pacific.—The company has several bills before the Dominion Parliament asking for various amendments to its charter. It also asks for the ratification of agreements with the Montreal & Western and the Qu Appelle, Long Lake & Saskatchewan, by which the Canadian Pacific is to operate these lines as fast as completed. The company also asks that it be granted general authority to lease, purchase or enter into traffic contracts with such roads in Canada and the United States as it may desire, without the necessity of having those agreements subject to future special ratification of the Dominion Parliament.

Passenger trains have commenced running on the Detroit extension from London to Chatham, Ont. The entire extension through to Detroit, 112 miles from London, will probably be open for freight and passenger traffic early in March.

Cape Fear & Yadkin Valley.—The extension between Fayetteville and Wilmington, N. C., 80 miles, was completed Feb. 7, and the line will probably be open for traffic next week. It is now in operation from Wilmington to Parkersburg, 52 miles.

Central of Georgia.—The earnings for the six months to Dec. 31 were as given below:

	1889.	1888.	Inc. or Dec.
Mileage.....	1,244	1,220	I. 24
Voyages.....	154	157	D. 3
Gross earnings.....	\$4,631,082	\$4,123,206	I. \$507,875
Oper. expenses.....	3,146,587	2,533,278	I. 613,309
Net earn.....	\$1,484,495	\$1,590,794	D. \$146,578
Income from invest.....	71,782	6,886	I. 64,915
Total net income.....	\$1,556,275	\$1,597,784	D. \$41,518

Chattanooga Southern.—The contract for building the line from the connection with the Chattanooga Union at Chattanooga to McLenore's Cave, Walker County, Ga., was awarded this week. The survey of the road has been finished as far as Alpine, Ga. The location has been made for 25 miles, passing through Eagle Cliff, High Point and Frick's Gap and Catlet's Gap at Pigeon Mountain, following up the valley to the east of Look-out Mountain. The two lines to Pigeon Mountain will come together again just beyond the mountain.

Chattanooga, Gadsden & Birmingham.—A construction company which has been organized to build the road between Gadsden and Leeds, Ala., has asked the city of Gadsden to give \$25,000 to its stock to complete the first 10 miles from that city.

Chesapeake & Ohio.—A bill has been introduced in the Virginia Legislature to build a road in the interest of this company from Gordonsville, Va., or some point on its line in that vicinity to Quantico, on the Baltimore & Potomac, giving the road a new entrance to Washington, D. C.

Chicago, Burlington & Northern.—The financial statement of the road for 1889 shows: Gross earnings, \$1,971,150; decrease from 1888, \$55,150; net earnings, \$644,650; increase \$291,006; total charges, 791,419; decrease, \$88,127; deficit, \$126,769; decrease, \$302,908. After operating expenses and taxes, the company failed to earn

the interest on its bonds by \$34,933, against a deficit under interest of \$277,812 in 1888, and \$111,314 in 1887.

Chicago & West Michigan.—The State Railroad Commission of Michigan has approved the survey of the extension from Traverse City northwest to the Antrim County line. The survey passes through Acme, Williamsburg and Spencer Creek to near Bellaire. From Bellaire the survey is to be continued to East Jordan. A branch has been located from Williamsburg north about 10 miles to Elk Rapids.

Cincinnati, Richmond & Chicago.—This road, extending from Hamilton, O., to Richmond, Ind., has become the property of the Pennsylvania Co., it having purchased the stock held by the Cincinnati, Hamilton & Dayton for \$350,000. The road is a part of the Pennsylvania's Cincinnati-Chicago line, and has been operated by the Pennsylvania Co. under a lease since August, 1888, by which an annual rental of \$17,500 has been paid. Under the terms of the lease the company had the privilege of purchase.

Cincinnati Southern.—Negotiations have been in progress since last November which will probably be completed within three weeks, for the purchase of this road and its associated lines by the East Tennessee, Virginia & Georgia. The basis of the proposed agreement has not yet been made known. The purchasing company will issue new stock to pay for the road.

Colorado, Kansas & Gulf.—This company has been incorporated in Kansas to build a road from Denver, Colo., to a point in Galveston County, Tex. The route as named in the charter would be over 1,000 miles long. The capital stock of the corporation is placed at \$20,000,000. The principal office is at Coldwater, Kan.

Columbus, Hocking Valley & Toledo.—A preliminary report for 1889 has been issued to the bond and stock holders by the trustees of this company. The gross earnings were \$2,509,518, and the operating expenses \$1,420,208, leaving a surplus of earnings over expenses of \$1,089,310. A rental of \$10,000 was received, which made the total surplus revenue \$1,099,310. The fixed charges were \$1,098,986. The decrease in earnings as compared with the previous year was \$334,451.

Dahlonega & Dawsonville.—This road is projected to extend from a point in Pickens County, Ga., near Tate, northwesterly via Dawsonville and Dahlonega to Lula Junction on the Richmond & Danville and the Northeastern of Georgia, about 55 miles. The first 30 miles of the line from Tate to Dahlonega has been surveyed. On this section the maximum grade is 60 ft. to the mile. The road is to be built to reach marble quarries in Pickens County. About 15 miles is through an iron ore region and the rest of the route is through a good agricultural section. The company expects to obtain the right of way practically free, and to receive large subscriptions from Dawson and Lumpkin Counties. Charles H. James, 284 Jones street, Atlanta, Ga., is Chief Engineer. Frank W. Hall, of Dahlonega, and James P. Harrison, of Atlanta, are also interested in the company.

Dallas, Pacific & Southeastern.—The local Texas papers state that the Texas Trunk, extending southeast from Dallas to Kemp, 49 miles, has been purchased by this road, and that work will begin immediately on the extension from Kemp southeast to Palestine, Tex., about 50 miles.

Danville, Mebane, Pittsboro & Southern.—Two townships in Alamance County, N. C., voted this week \$20,000 in subscriptions toward the construction of the road.

Denver, Texas & Fort Worth.—A party of engineers is reported as being engaged in surveying an extension from Wichita Falls, Tex., southwest to Seymour, and it is stated that contract for building part of the line will be let as soon as it has been located.

Grading is reported in progress on a short extension from Hodge Station, into the city of Fort Worth, Tex., which will be completed about the middle of next month.

Downingtown & Lancaster.—Keller & Crossan, of Lancaster, Pa., the contractors for the extension from New Holland southwest to Lancaster, Pa., 11 miles, have about 200 men and 80 teams engaged on the grading between New Holland and Midway, five miles. Rails are now being received, and track laying will probably be commenced shortly. The maximum curvature is one and one-half degrees.

East Tennessee, Virginia & Georgia.—A branch has been surveyed from Curry's Station, in Talladega County, to Ironton, Ala., a distance of four miles. The branch will reach the furnaces of the Clifton Iron Co.

Fort Worth & Rio Grande.—Ballasting has been finished on the section between Stephenville and Dublin, Tex., and the station buildings along the line have been erected. It is expected that the section will be open for traffic in a few days. The line from Dublin is under contract and it is stated that the contracts for constructing 25 miles from Comanche toward Granbury, Tex., will be let this month.

Grafton & Upton.—Freight is now being received between Hopedale and Grafton, Mass. The track on the extension from Grafton has been laid to Milford to within a short distance of the tracks of New York & New England. The company has been unable to put in the connection with the tracks of the latter road, as it has secured an injunction preventing such action. As soon as an amicable arrangement has been made between the companies the entire extension to Milford, eight miles, will be opened for traffic.

Grand Rapids & Lake Michigan.—The survey of this road is about completed. Two lines have been examined, one from Grand Rapids, Mich., to Holland, Saugatuck, and along the shore to St. Joseph, where connections will be made with the Vandallia line. The other line runs directly southwest from Grand Rapids to South Haven, and thence to St. Joseph. The latter line is 13 miles shorter than the Chicago & West Michigan. The stockholders will meet within two weeks for the purpose of reorganizing and determining upon the route. The road will not be maintained as an independent company, but will be operated by another road. It will be nearly an air line from Grand Rapids to Chicago, with important connections for Southern business. Charles E. Temple, of Grand Rapids, Mich., is General Counsel of the company.

Great Falls & Canada.—Large numbers of men have been sent out during the last two weeks to cut ties for the line. A surveying party will also soon go out under K. W. D. Barclay, Chief Engineer. The contract for

building the line has already been let to Donald Grant & Co., of Faribault, Minn., and it is proposed to begin grading early in the spring. The road is to extend from Great Falls, Mont., on the Great Northern line, to Lethbridge, Alberta, on the line of the Northwestern Railway & Navigation Co., about 225 miles. The owners of the latter company are the projectors of the Great Falls & Canada. From Great Falls the route is along the Sun River for some distance, then across the Muddy River and along the stream to the Acton River, crossing near Choteau, then north to the Sweet Grass Hills at the boundary line. The Northwestern Coal & Navigation Co. owns extensive coal lands in Alberta, and it expects a large demand for coal in Montana, which will be transported over the Great Falls & Canada to Montana towns and mines. Sir Alexander Galt, of Winnipeg, is President.

Kansas City, Nevada & Fort Smith.—The locating survey for the line will be completed this month. Grading will probably then begin. The road is to extend from Kansas City through Nevada to Monett, Mo. At Kansas City it will connect with the Kansas City Suburban Belt line. There is no very difficult work on the road south of Jackson County, and throughout the entire length there are comparatively few curves.

Kentucky Roads.—Bills have passed the Kentucky legislature incorporating the Fort Jefferson Belt, the Middlesborough Belt and the Lexington & Richmond roads.

Kettle Creek.—This company has been chartered in Pennsylvania to build a road from a point on the Philadelphia & Erie at the village of Westport, Clinton County, thence following the valley of the Kettle Creek to Trout Run. The length of the road is about 14 miles. The capital stock is \$350,000. Edgar Munson, Williamsport, Pa., is President.

Knoxville Southern.—With favorable weather all the grading between Blue Ridge, Ga., and Knoxville, Tenn., will be completed by March 15. Track laying is in progress on the Tennessee end of the line, and rails for 30 miles are on the ground.

Louisville, Hardinsburg & Western.—Tracklaying is now completed, and construction trains are running for 30 miles from Irvington to within 10 miles of Fordsville, Ky. The section from Hardinsburg on the Louisville, St. Louis & Texas to Irvington has been in operation for some time. Work on the branch south to the Falls of Rough will probably soon be commenced.

McKeesport & Belle Vernon.—This road is now operated by the Pittsburgh & Lake Erie in connection with the Pittsburgh, McKeesport & Youghiogheny. It is proposed to extend it from Belle Vernon south to Brownsville, on the Monongahela River, and it may possibly be extended still further south to connect with the Baltimore & Ohio at Morgantown, W. Va.

Mexican Roads.—A concession has been given by the Department of Public Works of Mexico to J. Antonio Pliego Perez, manager of the Ixtacalco road, for a line from the Garita "Porfirio Diaz," to Chapultepec, Veracruz and Consulado, to the Garita of "Arteaga." The same concessionaire has been empowered to build a similar line between the Puente del Molino and the town of Mexicalcingo, with an extension to Ixtapalapa.

Missouri, Kansas & Texas.—The company has been offered right of way through Clay, Archer and Baylor counties for a proposed extension from Henrietta through Archer City to Seymour, Tex. The survey for the line will be commenced in a few days. Besides the right of way, the towns offer \$75,000 in cash for the extension.

A subsidy of \$40,000 has been raised at Sherman, Tex., for the extension of the road from Denison to that place.

Missouri Pacific.—The engineers have recently completed the location for the extension of the Jefferson City, Boonville and Lexington branch from Boonville southeast along the Missouri River to Jefferson City, about 46 miles. The survey has been in progress for nearly two months and a half. The maximum grade on the line is 15 ft. to the mile. J. C. Kenton was engineer in charge of the survey.

Napanee, Tamworth & Quebec.—This company is seeking power to extend its line westerly to Sault Ste. Marie, with a branch to Sudbury, Ont., and easterly to the St. Lawrence River and to Ottawa, with branches to iron mines in the counties of Leeds, Lanark, Hastings, Frontenac, Peterboro', Victoria, and Nipissing district. The company also asks for power to construct a railroad bridge across the St. Lawrence, from a point near Sir William Island or Rockport, to some point in the State of New York. It is also desired to change the name of the road.

New Roads.—Haines Bros., of Kinderhook, N. Y., have submitted a proposition to build a road from Corsicana, Tex., south to Fairfield, 30 miles, if the two towns will subscribe \$75,000, and will also agree to give free right of way.

Haines Bros. have also agreed to build a standard gauge road from La Costa station, on the Galveston, Harrisburg & San Antonio, to Castroville, Tex., if the latter town will give the right of way for the road, subscribe \$20,000 to its capital stock, \$5,000 of which may be in work, and in addition give a bonus of 300 town lots.

The town of Sherman, Tex., has offered free right of way, station ground, and a large cash subscription for the proposed road from that town northwest about 53 miles to a connection with the Atchison, Topeka & Santa Fe, at Ardmore, Ind. Ter.

The Boston Coal Mining Co. proposes to construct a road from its mines in Leavenworth County, Kansas, to Kansas City. The company has about 13 acres of coal lands in Leavenworth County, and the road is to be built to transport the coal from the mines direct to the Kansas City market.

New York Central & Hudson River.—The following statement shows the earnings and operating expenses of the company and its leased lines for the quarter ending Dec. 31:

	1889.	1888.	Increase.
Gross earnings.....	\$9,421,252	\$9,170,889	\$250,363
Oper. expen.....	6,219,348	5,971,640	247,708
Expen. to earnings.....	(65,254)	(65,124)	
Net earnings.....	3,311,904	3,199,249	112,655
Fixed charges.....	1,965,420	1,963,260	2,160
Profit.....	1,346,484	1,235,989	110,495
Dividend.....	894,283	894,283	
Surplus.....	\$452,201	\$341,706	\$110,495

The gross earnings of the company for the month of

January were \$2,923,406, and increase of \$213,256 over the same month last year.

New York, Chicago & St. Louis.—The report for the quarter to Dec. 31 is as follows:

	1889.	1888.	Inc. or Dec.
Gross earn.	\$1,455,957	\$1,274,544	I. \$181,413
Oper. expen.	1,129,036	1,055,381	I. 73,655
Net earnings.	\$326,921	\$219,163	I. \$107,758
Other income	3,415	2,139	I. 1,276
Total net.	\$330,336	\$221,302	I. \$111,034
Charges	209,295	244,466	I. 35,171
Surplus.	\$121,041	def. \$24,164	I. \$145,205
Cash on hand	233,021	123,250	I. 109,771

North & South, of Louisville.—A bill to incorporate this company has been introduced in the Kentucky Legislature. The company proposes to construct on Ninth street, in Louisville, from its road canal to the southern boundary of the city, connecting with all roads entering the city. The company is to secure the right of way and permission to build from the city council before construction is to be commenced. The capital stock is \$1,000,000. P. G. Trunnell, of Louisville, is an incorporator.

Ottawa & Gatineau Valley.—Work has been commenced on the second 10-mile section of this road, and is being pushed rapidly forward by contractor Ryan. On this section, which is between Chelsea and the Peche, there is some heavy rock cutting to be done. Contracts have been made for the ties and bridge timber for 20 miles of the road.

Pennsylvania.—A short extension of the Amboy division of the New Jersey lines to Brown's Mills was completed last week and will shortly be placed in operation.

Philadelphia & Erie.—The annual report published this week shows that the gross earnings were \$4,689,137, an increase of \$316,095 compared with 1888, and net earnings \$1,778,573, an increase of \$122,723. The number of passengers carried was 1,294,944, an increase of 111,183. The freight tonnage was 9,339,419, an increase of 850,692. The capital stock outstanding at the end of 1889, including \$2,400,000, special stock, \$976,000 Sunbury & Erie first mortgage bonds, was \$19,474,000. The income account shows a balance, after paying all fixed charges, of \$469,851.63. The amount paid on account of Johnstown flood losses was \$421,081, less \$97,750 allowed for transportation of diverted traffic.

Plymouth & Bourne.—The second survey has been completed for the first five miles from Plymouth, Mass., and varies very much from the original line. The survey is to be continued to Bourne, on the Old Colony, about 22 miles from Plymouth. Henry Hancox, of Hudson, Mass., is Chief Engineer.

Richmond & Danville.—Tracklaying on the Winston & Wilkesboro extension of the road was completed from Winston to Rockford, Surry County, N. C., on Feb. 7.

Richmond Improvement & Railway Co.—There has been introduced in the Virginia Legislature a bill to incorporate this company to build a narrow or standard gauge road from a point in Richmond to Ashland, Hanover County, with the privilege of using electricity or steam as a motive power. The capital stock is to be \$75,000. The incorporators are Byrd Warwick, J. P. Carson, J. M. Chamblin, G. A. Gibson, W. H. Parrish, Jr., and E. S. Rogers.

Roanoke & Southern.—The bridge over the Dan River, north of Madison, N. C., will be completed shortly, and tracklaying will then be resumed between Madison and Martinsville, Va., 39 miles. The grading has already been finished to Martinsville, and when the tracklaying has been completed to that point work will probably be commenced on the section between Martinsville and Roanoke, 55 miles.

Franklin County, Va., is to hold an election on March 29 to vote on a proposition to subscribe \$75,000 to the company.

St. Louis & San Francisco.—The earnings and expenses for December, 1888 and 1889, were as below:

	1889.	1888.	Inc. or Dec.
Miles Operated.	1,329	1,329	
Gross Earnings.	\$604,232	\$535,506	I. \$68,726
Oper. Expn.	260,641	355,853	D. 95,212
Net Earnings.	\$343,591	\$179,653	I. \$163,938
Taxes	11,535	41,771	D. 30,236
Net Revenue.	\$332,056	\$137,882	I. \$194,174

Salmon Bay Railway & Development Co.—Articles of incorporation have been filed in Washington by Thomas Burke, John Leary and D. H. Gilman, of Seattle. The company intends to construct a road from Seattle around Salmon Bay and thence to the head of Lake Washington, and eventually to the Cascade range of mountains. The capital stock is \$2,000,000. The survey has been in progress for over a month from the intersection of the Seattle, Lake Shore & Eastern in Seattle, northerly to the mouth of Salmon Bay thence northeast to the head of Lake Washington, and east toward Snoqualmie.

Syracuse & South Bay.—The stockholders have authorized a mortgage for \$250,000 on the road from Syracuse, N. Y., north to South Bay, on Lake Oneida.

Union Pacific.—The following report gives the earnings for December and the 12 months:

Month of December:	1889.	1888.	Inc. or Dec.
Miles.	5,180	5,158	I. 21
Gross earnings.	\$2,784,708	\$2,511,673	I. \$273,034
Oper. expenses.	1,886,633	1,337,600	I. 549,033
Net earnings.	\$798,074	\$974,073	D. \$175,998
Year to Dec. 31:			
Aver. miles oper.	5,061	5,039	I. 121
Gross earnings.	\$31,070,181	\$30,195,521	I. \$874,660
Oper. expenses.	18,699,522	18,476,409	I. 223,113
Net earnings.	\$12,370,658	\$11,719,111	I. 651,546

Vincennes, Oakland City & Owensboro.—The company has recorded in Indiana a mortgage on the road in favor of the Central Trust Co., of New York, to secure \$1,400,000 of first mortgage bonds, which have been issued to provide funds for building the road from Vincennes, Ind., to a point on the Ohio River opposite Owensboro, Ky., a distance of 70 miles.

Virginia Roads.—Bills have passed the state legislature incorporating the Appomattox, Buckingham & Cumberland; Northwest & Southwest; Appalachian Belt; Pittsburgh, West Virginia & Potts Valley, and a new road from Richmond to Norfolk.

Western Maryland.—An officer is quoted as stating that the company has decided to build an extension north, via York, Pa., to the Susquehanna River, crossing it at Chickee's Furnace, and connecting with the Columbia Branch of the Philadelphia & Reading. The new line will parallel the Northern Central the entire distance.

West Virginia & Pineville.—Ground was broken at Pineville, Ky., last week for a new branch from Pineville, on the Cumberland Valley branch of the Louisville & Nashville up Straight Creek to the state line.

Wheeling & Lake Erie.—It is stated that the company will extend the road from Portland to Martin's Ferry, O., near Wheeling, W. Va., instead of building the extension through St. Clairsville to Bellaire, below Wheeling, as recently proposed. The extension to Steubenville has not been abandoned but is now under contract, and it is also reported that the contract has been let for the section between Portland and Martin's Ferry. Bellaire was asked to raise \$15,000 to secure the extension, but it has not yet succeeded in doing this.

Wichita Valley.—The company has been incorporated in Texas to build a road from Wichita Falls, southwest through the counties of Wichita, Baylor, Knox, King, Stonewall, Kent, Dickens, Garza, Lubbock, Lynn, Terry, Hockley, Yoakum, Lamb, Bailey and Palmer, a distance of 300 miles to the west line of the State of Texas, with a branch starting in Baylor or Knox counties and running through the counties of Throckmorton, Haskell, Stonewall, Jones, Fisher, Baylor, Nolan and Mitchell, a distance of 100 miles. The capital stock is \$6,000,000.

Wilmington & Weldon.—The extension of the Scotland Neck branch from Greenville south to Kingston, S. C., 28 miles, has been graded to within a few miles of the latter terminus.

Winnipeg & Duluth.—Application is to be made to the Winnipeg Legislature for a charter for this road. It is an extension of the Duluth & Winnipeg from the International boundary near the Lake of the Woods to Winnipeg. This will be the third company having a charter to build over this route.

Winnipeg & Northern Pacific.—The projectors of this road claim that if the government grant is secured soon the work of construction will be begun in a short time on a section of 100 miles from Winnipeg up to the narrows of Lake Manitoba, most of which will be built this year. The company asks 6,400 acres per mile from Winnipeg to Fort Alacorne, 10,000 acres per mile thence to the foot of the Rocky Mountains, and 12,000 acres per mile from the eastern slope of the Rockies to Port Simpson, on the Pacific.

Yadkin.—W. P. Fortune, of Asheville, N. C., has the contract for the grading on this road from Salisbury, N. C., to Norwood, a distance of 41 miles.

TRAFFIC.

Traffic Notes.

The Chicago, Burlington & Northern has not yet issued an official announcement of its proposed reduction in freight rates between Chicago and St. Paul.

The Michigan Central and the Grand Rapids & Indiana have inaugurated at Grand Rapids the free cartage of freight received from Buffalo, Pittsburgh, and points further east.

A train of 13 cars of dressed beef was last week run from Kansas City to New York over the Burlington, Lake Shore and New York Central roads in three days and nineteen hours.

The Chicago, Burlington & Quincy announces a 20 per cent. reduction in rates on packing-house products from the Missouri River by way of St. Louis to southeastern points. The reduction goes into effect on Feb. 15.

A carload of steamer freight received at Galveston from New York City in five days was transported from Galveston via the Santa Fe to Pueblo in 68 hours, and to Denver in 72, making the time from New York to Denver eight days.

Excursion tickets to New Orleans are being sold at very low rates, \$15 being the price for a round trip from Kansas City. The scalpers say they can reap big profits in handling these tickets for Memphis and other intermediate business.

There has been considerable stir at Pittsburgh by reason of the large amount of iron and other freight going to Chicago by the boats, which take it to Cincinnati and send it by rail from there. It is claimed that the rates are cut very much below all rail rates, and that under-billing is also common.

After prolonged discussions the Delaware, Lackawanna & Western persists in maintaining an independent emigrant ticket office in the lower part of New York City, and the other trunk lines, which have all agreed to the establishment of a joint bureau for this business, have demanded a final arbitration, which if not submitted to by the Lackawanna will effect its expulsion from the Trunk Line Association.

The Chicago, St. Paul, Minneapolis & Omaha has given notice that it will at once put into effect a reduced scale of rates from the Missouri River to St. Paul on business destined to New York, Boston and other eastern points. The action is taken to meet the competition of the Great Northern and the Sioux City and Northern lines. This makes through rates from Omaha to the seaboard by way of St. Paul and Canadian lines lower than those in effect by way of Chicago.

The differential passenger rates from St. Louis eastward have not been adopted by the roads west of the Mississippi River as was agreed upon a few weeks ago, because of a misunderstanding in the preparation of the rate sheets. There are two differentials from St. Louis, there being three grades of accommodation by the various roads, but from Chicago there is only one differential. In adjusting rates from points on and beyond the Missouri River, it was deemed necessary to insert in the tariffs only two rates from St. Louis in order to equalize the conditions between that city and Chicago; but this action disturbs competitive traffic, and the Missouri Pacific has refused to put the new rates in effect.

The Chicago, Milwaukee & St. Paul, in the meeting of the Southern division of the Western Freight Association, at Chicago, Tuesday, announced a reduction of 33 1/3 per cent. on all freight between Chicago and Kansas City. The meeting was opened by Chairman Mideley, who read the results of an investigation into various charges of manipulation in rates made by various members against other members. Chairman Mideley said the investigation had been an exhaustive

one and developed absolute proof that every road in the association, except the Missouri Pacific and St. Paul, were guilty, as charged, in manipulating rates. Mr. Hiland, of the St. Paul, immediately drew from his pocket his paper announcing the cut by that road. The other roads present voted that an appeal to arbitration be taken on the proposed rates, and under the rules it is so ordered. The St. Paul was compelled to await the delay under the rules.

The Interstate Commerce Commission.

The Commission on Feb. 7 in an opinion by Commissioner Veazey, rendered its decision in the case of Hervey Bates and H. Bates, Jr., owners of the Indianapolis Hominy Mills, against the Pennsylvania and the Baltimore & Ohio, in favor of complainants. This case involves the question of the legality of a difference in the rates on corn and corn products from Indianapolis east to seaboard points, and the Commission decides in part as follows:

The defense of water competition, from Chicago and the lake shipping points to seaboard points east as a justification for an otherwise unjustifiable discrimination in rate between corn and its direct products from Indianapolis to said seaboard points, is held to be untenable, owing to the situation of Indianapolis as to the lakes, and to the location of the territory where the corn was mainly raised that was marketed at Indianapolis, and to the other facts established in this case. A discrimination between the rate on corn and its direct products from a given locality, resulting from a reduction of the rate on corn below the rate on its direct products, which subjected persons in that locality engaged in the business of manufacturing corn into its direct products, and of selling the same, to unreasonable prejudice and disadvantage, and was without necessity or advantage to the carrier, or any reason founded on the character or condition of the traffic, is held to be in violation of Section 3 of the Act to Regulate Commerce, notwithstanding the new rate on corn was open to all persons equally and with equal service. When carriers, other than the respondents of record, are committing the same violations of the Act to Regulate Commerce as the respondents, an order may issue against the respondents, and the case be held for the purpose of bringing such other carriers into the case, to be proceeded against, unless they comply with the order.

Reduced Rates on Corn from Nebraska and Kansas.

The railroad managers and the Nebraska Board of Transportation arrived at an agreement in Chicago last week. The railroads will reduce the rates on corn from all points west of the Missouri River to Chicago 10 per cent., making the minimum rate 20 cents and the maximum 25 cents per 100 lbs. The reduction will in most cases amount to less than 1 1/2 cents a bushel, and it is said that the announcement has already caused a reduction in the price of corn at the Missouri River, so the farmers who wanted the reduction will probably receive no benefit from it. Kansas farmers have demanded a similar reduction and it has been granted by the railroads.

Demurrage.

The car service trouble came to the front at the Dayton meeting of the Union Association of Lumber Dealers, but after it was all discussed, the thinking members were compelled to admit that demurrage for withholding a car was founded on strict business principles. The average movement of each car is less than two hours' run out of 24. An employer who only got one hour's work a day out of an employe would think he had made rather a poor bargain. When a lumberman admits that the lumbermen have been guilty of much of the delay, it is evident that the railroads are not wholly to blame. But the car service association has fixed the time for unloading at only 48 hours, which is manifestly too short in cities and large towns.—Northwestern Lumberman.

Interstate Commerce Railway Association.

The presidents of the lines in the Association, at the meeting in Chicago Tuesday, unanimously accepted the resignations from the association of the Union Pacific and Chicago & Northwestern railroads, to take effect, by the terms of their notices of withdrawal, on Feb. 23 and 26, respectively. The session was a short one. The chairmen, who are preparing a new agreement for the association, did not report at this meeting. The new agreement has hardly been considered, and besides, under the resolution passed at the New York meeting, the report is to be presented at a meeting of the presidents of all Western lines members of any association. That meeting will probably not be called for six weeks.

Coal Tonnage of the Pennsylvania Lines.

The tonnage of coal and coke originating on lines of the Pennsylvania in the years 1889 and 1888 was as follows:

	1889.	1888.	Inc. or Dec.
Coal.	10,947,362	11,617,139	D. 669,777
Coke.	4,630,689	4,154,267	I. 476,422
Total.	15,578,051	15,771,406	D. 193,355

East-bound Shipments.

The shipments of east-bound freight from Chicago by all lines for the week ending Saturday, Feb. 8, amounted to 105,539 tons, against 95,269 tons during the preceding week, an increase of 10,270 tons, and against 61,891 tons during the corresponding week of 1889, an increase of 43,648 tons. The proportions carried by each road were:

	W'k to Feb. 8.		W'k to Feb. 1.	
	Tons.	P. c.	Tons.	P. c.
Michigan Central.	11,626	13.9	10,243	10.8
Wabash.	5,346	6.0	7,672	8.0
Lake Shore & Michigan South.	22,226	21.1	20,149	21.2
Pitts. Ft. Wayne & Chicago.	14,575	13.6	9,532	10.0
Chicago, St. Louis & Pitts.	7,976	7.5	10,200	10.7
Baltimore & Ohio.	7,976	7.5	8,956	9.4
Chicago & Grand Trunk.	11,387	10.8	11,636	12.2
New York, Chic. & St. Louis.	8,651	8.2	7,847	8.2
Chicago & Atlantic.	11,973	11.4	9,625	9.5
Total.	105,539	100.0	95,269	100.0

Of the above shipments 63.6 tons were flour, 62,128 tons grain, 2,520 tons millstuffs, 6,357 tons cured meats, 6,183 tons lard, 3,906 tons dressed beef, 1,175 tons butter, 1,848 tons hides, 39 tons wool and 4,984 tons lumber. The three Vanderbilt lines together carried 43.2 per cent. of all the shipments, while the Pennsylvania lines carried 21.1 per cent.